



YUKON RIVER SUMMER CHUM SALMON STOCK STATUS AND DEVELOPMENT OF MANAGEMENT/ACTION PLAN OPTIONS

A Report to the Alaska Board of Fisheries

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SECTION I

Yukon River Summer Chum Salmon Stock Status

Synopsis

In response to the guidelines established in the *Sustainable Salmon Fisheries Policy*, the BOF classified the Yukon River summer chum salmon stock as a management concern at the September 2000 work session. The Yukon River summer chum salmon stock meets the definition of a management concern based on escapement levels since 1998 and an anticipated poor run in 2001.

Escapement

Summer chum salmon biological escapement goals (BEGs) are based on aerial surveys except for the Anvik River BEG, which is a sonar-generated estimate. The Anvik River summer chum salmon BEG is based on a stock-specific spawner-recruit relationship. Minimum aerial survey escapement goals have been established in the East and West Fork Andreasky, North Fork Nulato, Gisasa, Chena, Salcha and Clear Creek Rivers within the Alaska portion of the Yukon River drainage. From 1998 through 2000, spawning escapement goals were not achieved except for the Anvik River in 1998 and 1999, despite the use of specific management measures.

1995

- Escapement goals considered achieved.
- Parent-year escapements appeared fair.

1996

- Escapement goals considered achieved.
- Parent-year escapements appeared fair.

1997

- Escapement goals generally achieved.
- Parent-year escapements appeared fair.

1998

- Escapement goals generally not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests may not have resulted in the achievement of escapement goals.
- Parent-year escapements appeared good.

1999

- Escapement goals generally not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests may not have resulted in the achievement of escapement goals.
- Parent-year escapements appeared good.

2000

- Escapement goals generally not achieved.
- Specific management actions were taken to reduce harvests. Further reductions in harvests would not have resulted in the achievement of escapement goals.
- Parent-year escapements appeared good.

Harvest

Subsistence-only harvests have averaged 95,441 summer chum salmon (1995-1999) annually through subsistence-only fishing activities. Additionally, some summer chum salmon carcasses from the commercial chum salmon roe fishery in the Upper Yukon Area are used for subsistence. The commercial guideline harvest range (GHR) for summer chum salmon is 400,000 – 1,200,000. Commercial harvest of summer chum salmon remained in the upper half of the GHR until 1997 when it fell below the lower end of the GHR. The 1997 commercial harvest of 228,252 summer chum salmon was below the low end of the GHR. The commercial harvests during 1995-1997 were lower than the available harvestable surplus because of market factors. The 1998 and 1999 commercial harvests were 28,798 and 29,413 summer chum salmon, respectively, and were below the low end of the GHR. The 2000 commercial harvest of 6,624 summer chum salmon was the lowest harvest since 1967. Specific management measures were taken in 1998, 1999, and 2000 in an attempt to achieve summer chum salmon escapements throughout the drainage.

1995

- Subsistence only harvest was 118,753 summer chum salmon.
- 818,414 summer chum salmon harvested commercially. Above midpoint of GHR.

1996

- Subsistence only harvest was 102,503 summer chum salmon.
- 682,233 summer chum salmon harvested commercially. Above midpoint of GHR.

1997

- Subsistence only harvest was 97,109 summer chum salmon.
- 228,252 summer chum salmon harvested commercially. Below low end of GHR.

1998

- Subsistence only harvest was 86,004 summer chum salmon.
- 28,798 summer chum salmon harvested commercially. Below low end of GHR.
- Lowest commercial harvest since 1969.

1999

- Subsistence only harvest was 70,323 summer chum salmon.
- 29,413 summer chum salmon harvested commercially. Below low end of GHR.

2000

- Specific management actions reduced subsistence harvest opportunity.
- 6,624 summer chum salmon harvested commercially. Below low end of GHR.
- Lowest commercial harvest since 1967.

Outlook

Overall, the year 2001 summer chum salmon run is anticipated to be weak to below average in strength for the fourth year in a row. Parent year escapements in 1996 and 1997 were judged to be average or above average in magnitude. However, parent year escapements for 1998, 1999, and 2000 runs were also judged to be above average in magnitude. The returns from these parent years displayed below-average trends in survival. Specifically, production of Anvik River chum salmon, which represents the largest spawning stock of Yukon River summer chum salmon, has fallen to well below 1 return per spawner for the 1993, 1994, 1995, and apparently the 1996, brood years. Causes for the observed drop in productivity are still largely unknown, as are the duration and exact magnitude of current production levels. Given the uncertainties associated with recent declines in productivity, it is uncertain if the run will support a commercial harvest and it could require reductions in subsistence harvest opportunity.

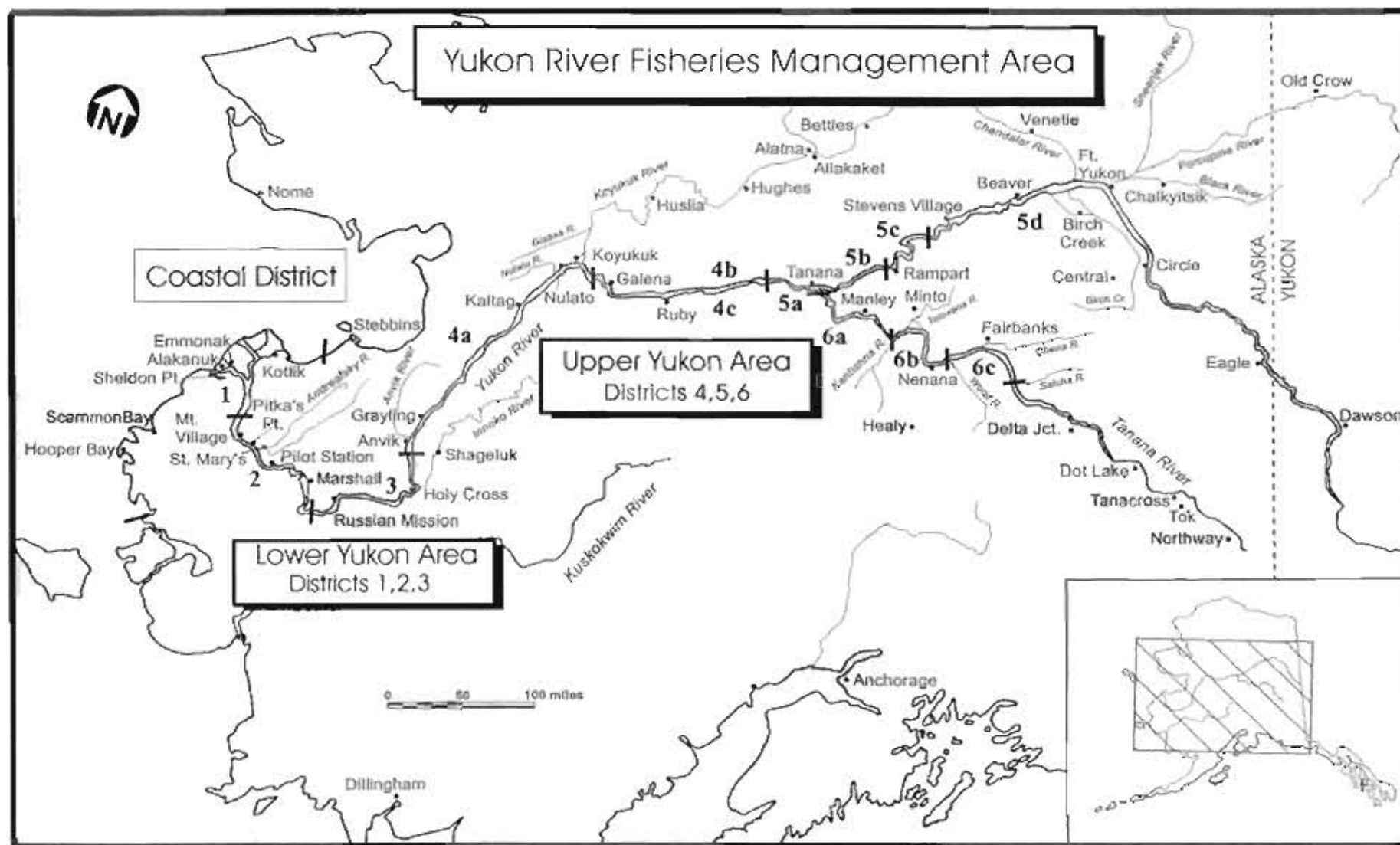


Figure 1. Map of the Alaska portion of the Yukon River drainage showing communities and fishing districts.

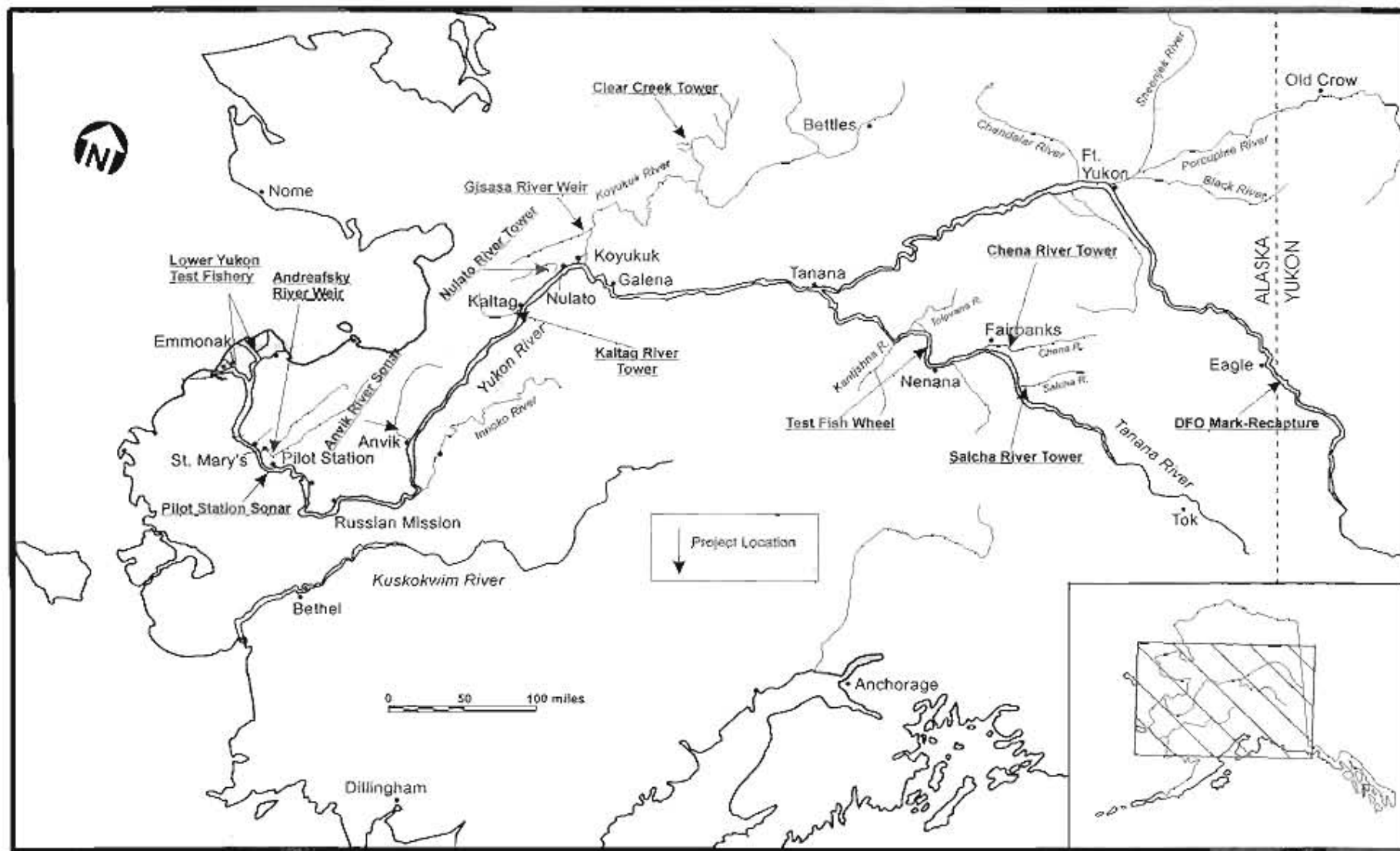


Figure 2. Select summer season monitoring projects, Yukon River drainage, 2000.

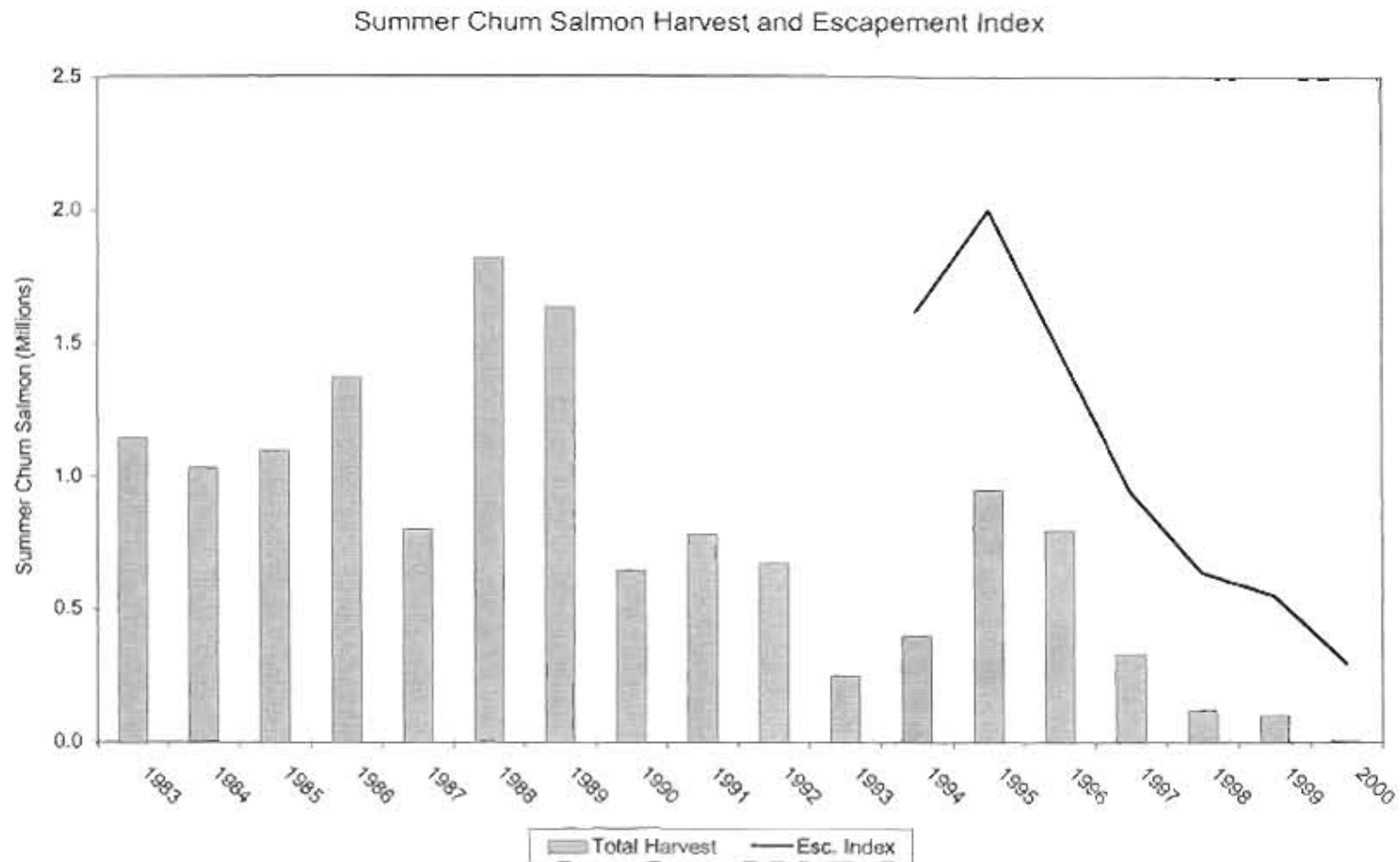


Figure 3. Summer chum salmon harvest and escapement index, 1983-2000. ^{a,b,c}

^a Escapement Index is East Fork Andreasky River weir, Arvik River sonar, Kaltag River tower, Nulato River tower, Gasea River weir, Chena River tower, and Selkha River tower escapement estimates.

^b The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.

^c 2000 harvest and escapement index data is preliminary.

Summer Chum Salmon

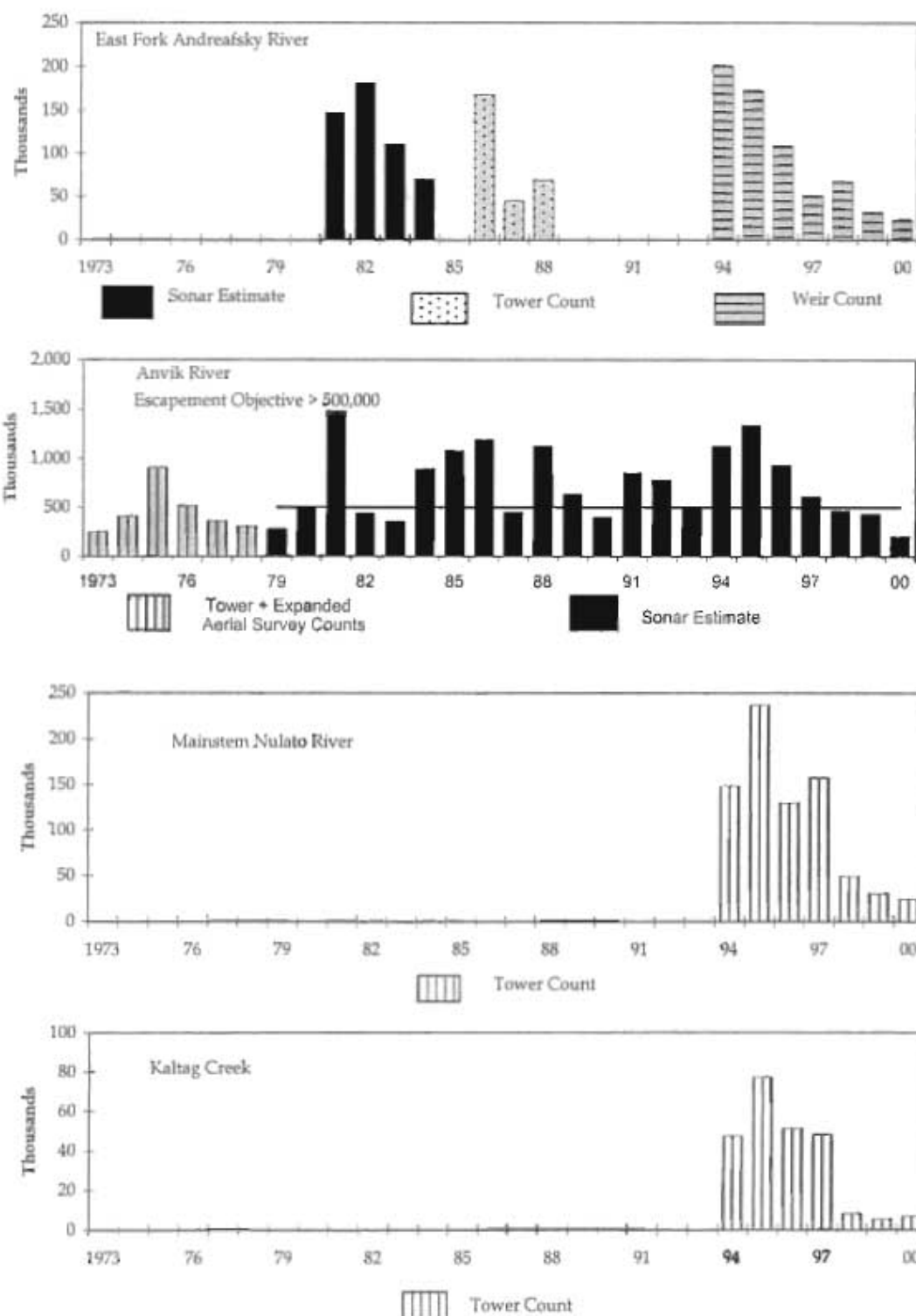


Figure 4. Summer chum salmon escapement data for selected spawning areas in the Yukon River drainage, 1973-2000. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis is variable.

Summer Chum Salmon

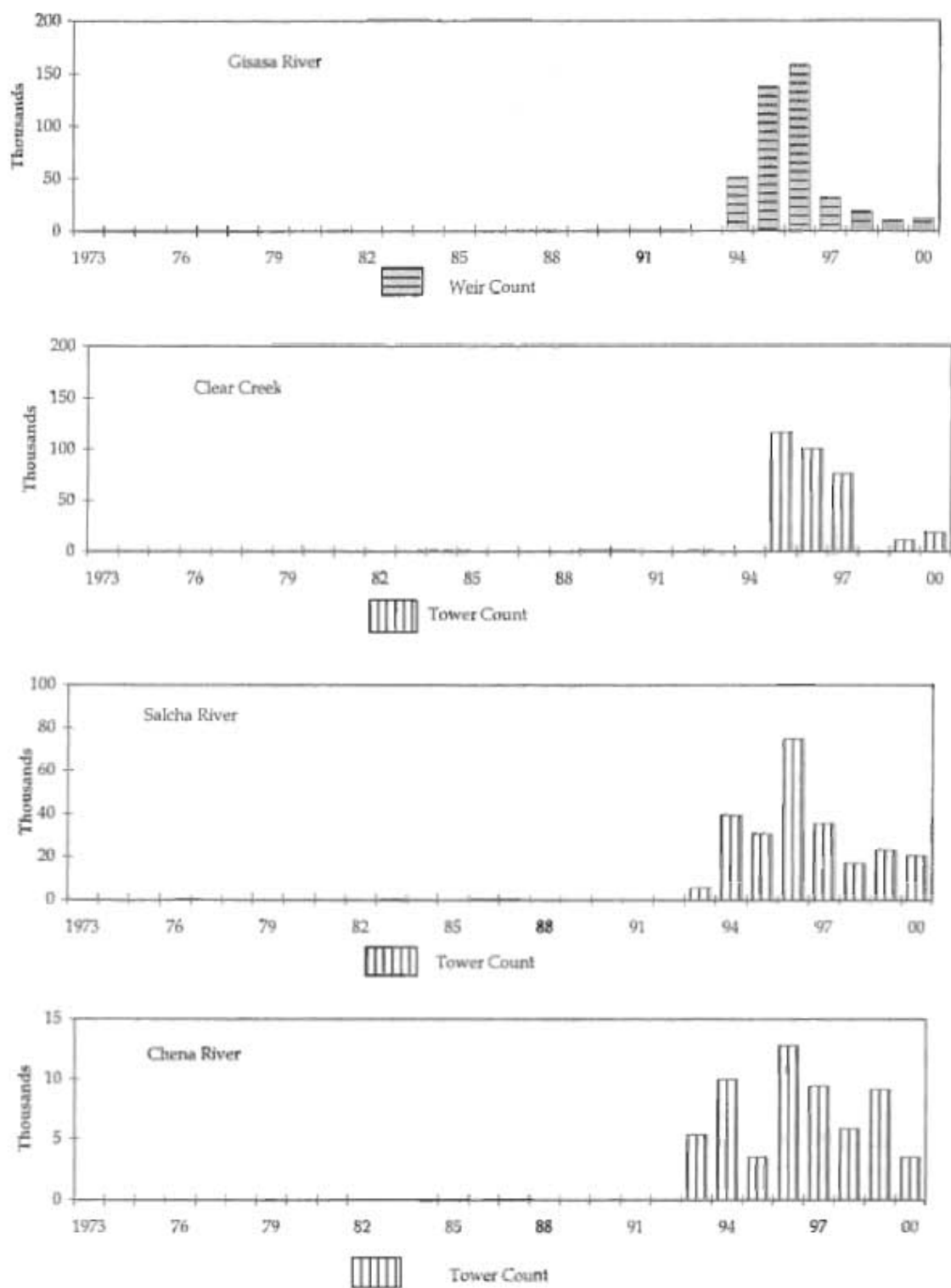


Figure 4 (page 2 of 2).

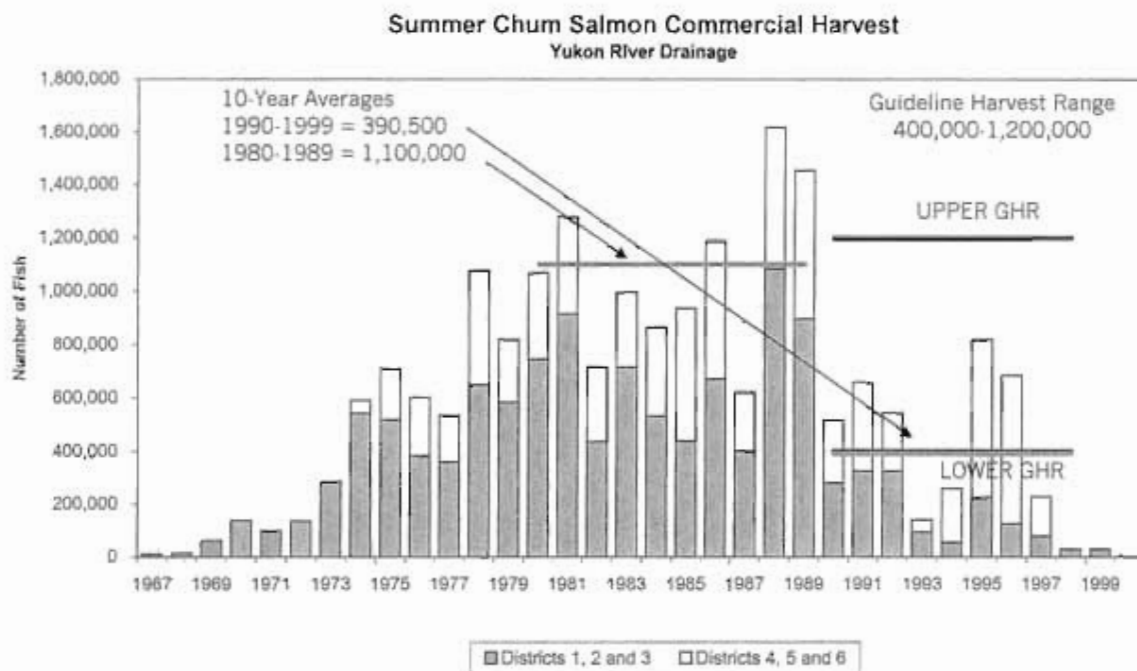
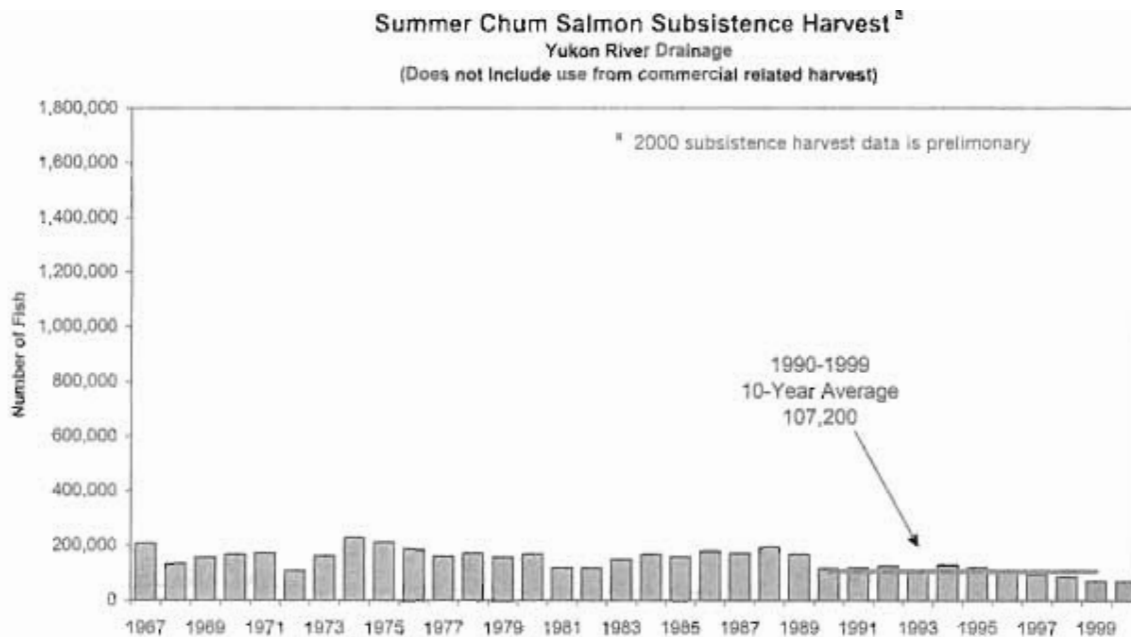


Figure 5. Subsistence and commercial harvest of summer chum salmon, Yukon River Drainage, 1967-2000.

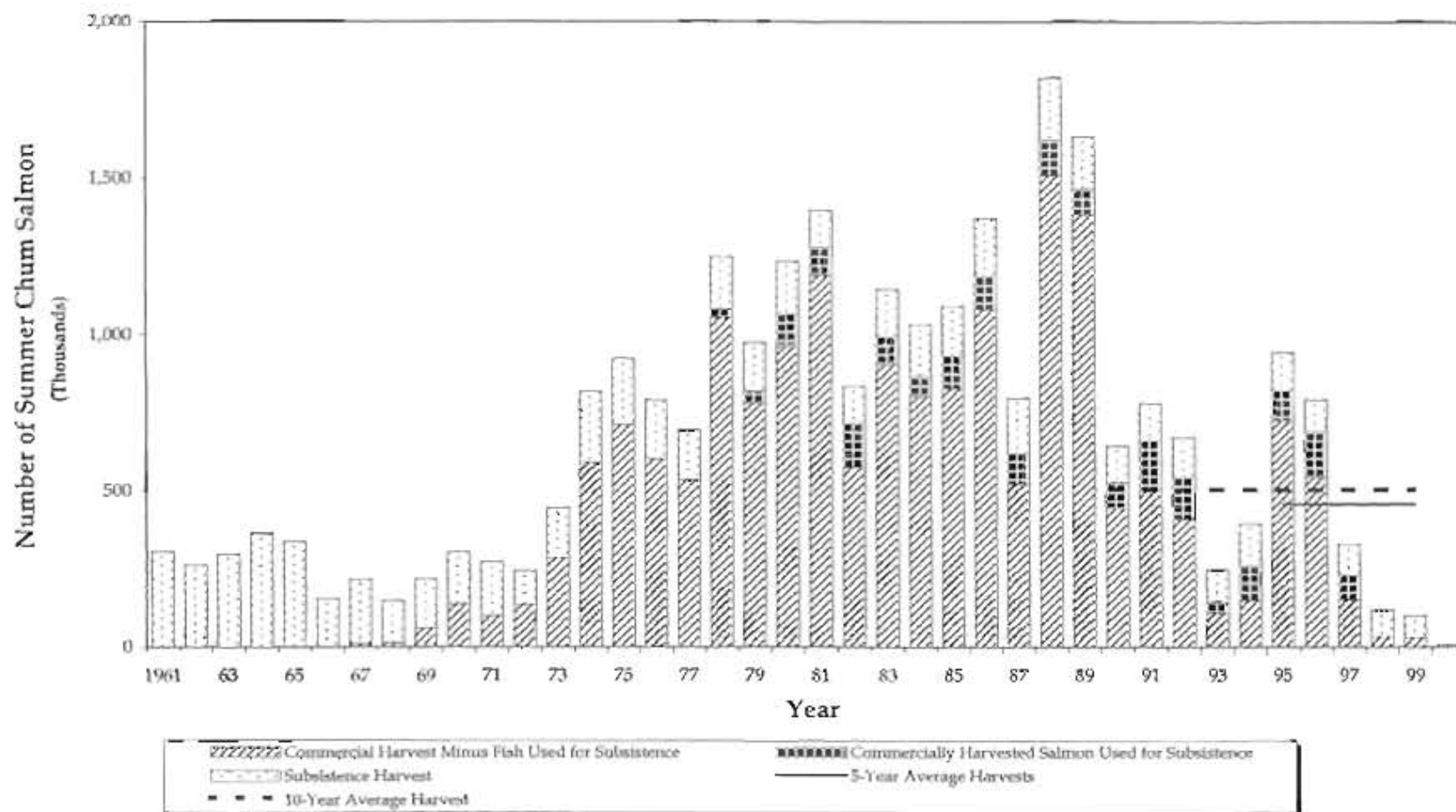


Figure 6. Alaskan harvest of summer chum salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.

Table 1. Assessment of Yukon River summer chum salmon escapements, 1995-2000.

Location	1995-1999 Average Estimate or Goal	1995		1996		1997		1998		1999		2000	
		Estimate	Assessment Made Goal or Average?	Estimate	Assessment Made Goal or Average?	Estimate	Assessment Made Goal or Average?	Estimate	Assessment Made Goal or Average?	Estimate	Assessment Made Goal or Average?	Estimate	Assessment Made Goal or Average?
E.F. Andreafsky River													
Weir	85,311 (Estimate)	172,148	Above avg.	108,450	Above avg.	51,139	Below avg.	67,591	Below avg.	32,229	Below avg.	23,500	Below avg.
Aerial Survey	> 109,000 (Goal)	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown
W.F. Andreafsky River													
Aerial Survey	> 116,000 (Goal)	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown
Anvik River													
Sonar	> 500,000 (Goal)	1,339,418	YES	933,240	YES	609,118	YES	471,865	YES	437,631	YES	205,815	NO
Kaltag Creek													
Tower	37,986 (Estimate)	77,193	Above avg.	51,269	Above avg.	48,018	Above avg.	8,113	Below avg.	5,339	Below avg.	6,727	Below avg.
Nulato River													
Tower	120,755 (Estimate)	236,890	Above avg.	129,694	Above avg.	157,975	Above avg.	49,140	Below avg.	30,076	Below avg.	24,308	Below avg.
Aerial N. Fork	> 53,000 (Goal)	29,949	NO	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown	Not Flown	Unknown
Gisasa River													
Weir	70,885 (Estimate)	136,886	Above avg.	157,589	Above avg.	31,802	Below avg.	18,228	Below avg.	9,920	Below avg.	11,415	Below avg.
Clear Creek													
Tower	61,119 (Estimate)	116,735	Above avg.	100,912	Above avg.	76,454	Above avg.	212	Below avg.	11,283	Below avg.	18,698	Below avg.
Aerial	> 8,000 (Goal)	20,625	YES	16,660	YES	Not Flown	Unknown	120 (Incomplete)	Unknown	Not Flown	Unknown	Not Flown	Unknown
Chena River													
Tower, Mark/Recap	8,167 (Estimate)	3,519	Below avg.	12,810	Above avg.	9,439	Above avg.	5,901	Below avg.	9,165	Above avg.	3,515	Below avg.
Salcha River													
Tower, Mark/Recap	36,432 (Estimate)	30,784	Below avg.	74,827	Above avg.	35,741	Average	17,589	Below avg.	23,221	Below avg.	20,516	Below avg.
Aerial survey, Index	> 3,500 (Goal)	934 (Incomplete)	Unknown	9,722	YES	3,968 (Incomplete)	YES	370 (Incomplete)	Unknown	150 (Incomplete)	Unknown	124 (Incomplete)	Unknown

Table 2. Yukon River drainage salmon spawning escapement goals for selected species and streams, 2000.

Stream	Escapement Goals ^a			
	Chinook	Summer Chum	Fall Chum	Coho
Andreafsky River				
East Fork	> 1,500	> 109,000		
West Fork	> 1,400	> 116,000		
Anvik River				
Aerial				
Mainstem (entire drainage)	> 1,300			
Yellow River to McDonald Creek	> 500			
Sonar		> 500,000 ^d		
Nulato River				
North Fork	> 800	> 53,000		
South Fork	> 500			
Hogatza River				
Clear Creek		> 8,000		
Caribou Creek		> 9,000		
Gisasa River	> 600			
Chena River				
Mainstem from Flood Control				
Dam to Middle Fork	> 1,700			
Salcha River				
TAPS to Caribou Creek	> 2,500	> 3,500		
Sheenjek River			> 64,000 ^c	
Fishing Branch River (YT, Canada)			50,000-120,000 ^d	
Toklat River			> 33,000 ^c	
Delta River Index Areas			> 11,000 ^c	> 9,000 ⁱ
Mainstem Yukon River in Y.T., Canada ^b	33,000-43,000 ^{i,g}		> 80,000 ^{g,h}	

^a Index streams have been designated because of their importance as spawning areas and/or by their geographic location with respect to other unsurveyable salmon spawning streams in the general area. Escapement goals represent the approximate number of desired spawners considered necessary to maintain the historical yield from the stocks and are based upon historical performance, i.e., they are predicated upon some measure of historic average. Unless otherwise indicated, escapement goals are based upon aerial survey index estimates which do not represent total escapement but do reflect annual spawner abundance when using standard survey methods under acceptable survey conditions. These survey goals represent the latest review and revision by ADF&G (March 1992), unless otherwise noted.

^b Escapement goals of total spawning abundance based upon sonar, weir, mark-and-recapture, or expansions from inseason point estimates.

^c Escapement goals developed by ADF&G for November 1990 U.S./Canada JTC meeting.

^d Escapement goals developed by JTC in October 1987. (see page 42 of the October 6-8, 1987 JTC report).

^e Escapement goals developed by JTC in March 1987. Additionally, a rebuilding step escapement goal for years 1996-2001 of 28,000 chinook salmon has been agreed to by the U.S. and Canada.

^g Estimated total spawning escapement excluding the Porcupine River (estimated mainstem Yukon River border passage minus Canadian harvests).

^h Escapement goals developed by JTC in November 1990.

ⁱ Escapement goals established by ADG&G in March 1993.

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Year	Andreadsky River			Arvik River		Rode River	Kaltag Creek	Nulato River			Gisasa River		Hogatz River		Fozitna River	Chena River		Selkha River		
	East Fork		West Fork	Tower & Aerial ^b	Square	Aerial	Tower	South Fork	North Fork	Mainstem	Aerial	Weir	Clear & Caribou Cr.	Clear Creek	Aerial	Aerial	Tower	Aerial	Tower	
	Aerial	Weir Counts	Aerial					Aerial	Aerial				Tower	Aerial						Tower
1973	10,149 ^d		51,835	249,015													79 ^d		290	
1974	3,215 ^d		33,578	411,133		16,137		29,016	29,334		22,022				1,823	4,349		3,310		
1975	223,485		235,954	900,967		25,335		51,215	87,280		56,904		22,355		3,512	1,670		7,573		
1976	105,347		118,420	511,473		38,258		9,230 ^d	30,771		21,342		20,741		725 ^d	685		6,484		
1977	112,722		63,120	358,771		16,118		11,385	58,275		2,204 ^d		10,734		761 ^d	610		677 ^d		
1978	127,050		57,321	307,270		17,845		12,821	41,659		9,280 ^d		5,102		2,262	1,609		5,405		
1979	66,471		43,391		280,537			1,506	35,598		10,962				14,221	1,025 ^d		3,060		
1980	36,823 ^d		114,759		492,676			3,702 ^d	11,244 ^d		10,308		19,786		580	338		4,140		
1981	81,555	147,312 ^f			1,486,182			14,348								3,500		8,500		
1982	7,501 ^d	181,352 ^f	7,267 ^d		444,581						54 ^d		4,984 ^d		874	1,509		3,756		
1983		110,608 ^f			362,912			1,263 ^d	19,749		2,356 ^d		28,141		1,604	1,097		716 ^d		
1984	95,200 ^d	70,125 ^f	238,565		891,028								184 ^d			1,861		9,810		
1985	66,146		52,750		1,080,243	24,576		10,494	19,344		13,232		22,566		1,030	1,005		3,178		
1986	83,931	167,614 ^e	99,373		1,189,602			16,845	47,417		12,114				1,778	1,309		8,028		
1987	6,487 ^d	45,221 ^e	35,535		455,876			4,094	7,163		2,123		5,669 ^d			333		3,657		
1988	43,056	68,937 ^e	45,432		1,125,449	13,872		13,132	26,951		9,284		6,800		2,983	432		2,889 ^d		
1989	21,460 ^d				636,906											714 ^d		1,574 ^d		
1990	11,519 ^d		20,428 ^d		403,827	1,941 ^d		3,196 ^{d,b}	1,419 ^d		450 ^d		2,177 ^d		36	245 ^d		450 ^d		
1991	31,886		46,657		847,772	3,977		13,150	12,491		7,003		9,947		93	115 ^d		154 ^d		
1992	11,508 ^d		37,808 ^d		773,826	4,465		5,327	12,358		9,300		2,986		794	848 ^d		3,222		
1993	10,935 ^d		9,111 ^d		517,409	7,867		5,486	7,698		1,581				978	168	5,400	212	3,809	
1994		200,981 ^f			1,124,689		47,295			148,762 ^k	6,827	51,116 ^k	8,247 ^m			1,137	9,984	4,916	39,450	
1995		172,148 ⁱ			1,339,418	12,849	77,193	10,875	29,949	236,890 ^j	6,458	136,886		116,735	4,985	185 ^d	3,519 ^k	934 ^d	30,784	
1996		108,450 ⁱ			933,240	4,380	51,269	8,490 ^{d,b}		129,694 ^k		157,589	27,090 ^m	100,912	2,310	2,061	12,810 ^k	9,722 ^d	74,827	
1997		51,139 ⁱ			609,118	2,775 ^d	48,018			157,975 ^k	686 ^d	31,800	1,821 ^d	76,454	428 ^d	594 ^d	9,439 ^k	3,968 ^d	35,741	
1998		67,591 ⁱ			471,865 ⁿ		8,113			49,140 ^k		18,228 ^k	120 ^d	212 ^k	7 ^d	24 ^d	5,901 ^k	370 ^d	17,289	
1999		32,229 ⁱ			437,631 ⁿ		5,300			30,076 ^k		9,920 ⁿ		11,300		9,165 ^k			23,221	
2000	2,094 ^e	21,349 ⁱ	18,989 ^d		205,815		6,727 ^d			24,308 ^k		11,415 ⁿ		18,698		480	107 ^d	3,515	228 ^d	20,516
E.O. ⁿ	>109,000		>116,000		>500,000					>53,000 ⁿ				>17,000 ^p					>3,500	

Table 3 (page 2 of 2).

- ^a Aerial survey counts are peak counts only, survey rating is fair or good unless otherwise noted.
- ^b From 1972-1979 counting tower operated; escapement estimate listed is the tower counts plus expanded aerial survey counts below the tower (see Buklis 1982).
- ^c Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.
- ^d Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
- ^e Sonar count.
- ^f Tower count.
- ^g Mainstem counts below the confluence of the North and South Forks of the Nulato River included in the South Fork counts.
- ^h Weir count.
- ⁱ Incomplete count due to late installation and/or early removal of project or high water events.
- ^j BLM helicopter survey.
- ^k Interim escapement goals. Established March, 1992.
- ^l Interim escapement objective for North Fork Nulato River only.
- ^m Consists of Clear and Caribou Creeks interim escapement objectives of 9,000 and 8,000, respectively.
- ⁿ Data are preliminary.
- ^o Consists of Clear Creek only.
- ^p Estimate is expanded for missing data caused by high water. Actual count in published agency reports may vary.
- ^q Preliminary escapement goal review for Anvik sonar suggest a range of 400,000 to 800,000 chum salmon.

Table 4. Alaskan catch of Yukon River summer chum salmon, 1961-2000

Year	Estimated Subsistence Use ^a	Harvest			Total
		Subsistence ^b	Commercial ^c	Sport ^d	
1961	305,317 f	305,317 f	0		305,317
1962	261,856 f	261,856 f	0		261,856
1963	297,094 f	297,094 f	0		297,094
1964	361,080 f	361,080 f	0		361,080
1965	336,848 f	336,848 f	0		336,848
1966	154,508 f	154,508 f	0		154,508
1967	206,233 f	206,233 f	10,935		217,168
1968	133,880 f	133,880 f	14,470		148,350
1969	156,191 f	156,191 f	61,966		218,157
1970	166,504 f	166,504 f	137,006		303,510
1971	171,487 f	171,487 f	100,090		271,577
1972	108,006 f	108,006 f	135,668		243,674
1973	161,012 f	161,012 f	285,509		446,521
1974	227,811 f	227,811 f	589,892		817,703
1975	211,888 f	211,888 f	710,295		922,183
1976	186,872 f	186,872 f	600,894		787,766
1977	159,502	159,502	534,875	316	694,693
1978	197,144	171,383	1,077,987	451	1,249,821
1979	196,187	155,970	819,533	328	975,831
1980	272,398	167,705	1,067,715	483	1,235,903
1981	208,284	117,629	1,279,701	612	1,397,942
1982	260,969	117,413	717,013	780	835,206
1983	240,386	149,180	995,469	998	1,145,647
1984	230,747	166,630	866,040	585	1,033,255
1985	264,828	157,744	934,013	1,267	1,093,024
1986	290,825	182,337	1,188,850	895	1,372,082
1987	275,914	174,940	622,541	846	798,327
1988	311,742	198,824	1,620,269	1,037	1,820,130
1989	249,582	169,046	1,463,345	2,131	1,634,522
1990	201,839 g	117,436	525,440	472	643,348
1991	275,673 g	118,540	662,036	1,037	781,613
1992	261,448 g	125,497	545,544	1,308	672,349
1993	139,541 g	106,054	141,985	564	248,603
1994	245,973 g	132,494	261,953	350	394,797
1995	221,308 g	119,503	824,487	1,174	945,164
1996	248,856 g	103,408	689,542	1,854	794,804
1997	177,506	97,500	230,842	475	328,817
1998	86,275	86,088	31,817	421	118,326
1999	71,040	70,705	29,412		100,117
2000			7,272		7,272
Average					
1961-89	227,762	190,858	546,003	825	737,231
1990-99	192,946	107,723	394,306	851	502,794
1995-99	160,997	95,441	361,220	981	457,446

a Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

b Includes salmon harvested for subsistence and personal use.

c Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

d Includes both summer and fall chum salmon sport fish harvest within the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage.

e Catches estimated because catches of species other than chinook salmon were not differentiated.

f Subsistence harvest, summer chum salmon commercially harvested for the production of salmon roe in District 5 and 6, and the estimated subsistence use of commercially-harvested summer chum salmon in District 4.

g Data are preliminary.

h Data are unavailable at this time.

Table 5. Estimated summer chum salmon sustainable harvest by fishing district and by community of residence, Yukon Area, 1985-1998. a

Community	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1985-1993 Average	1994-1998 Average
Hooper Biv	23,059 b	2,293 b			12,900	16,196	10,565	13,374	15,579	12,310	281	10,146	13,390 c	10,474
Scammon Bay	8,171 b	48 b			3,795	4,602	4,347	3,986	6,365	3,401	1,101	3,215	4,177 c	3,640
Coastal District Subtotal	31,230	2,341			16,695	20,798	14,913	17,360	22,235	15,711	1,382	13,461	17,566	14,314
Sheldon Point	2,589	4,314	1,458	2,228	1,415	2,362	1,941	2,979	2,834	2,603	1,872	1,343	2,394	2,406
Atkasook	6,992	12,108	7,295	8,058	9,851	8,835	5,947	10,538	8,171	7,443	5,543	3,806	8,885	7,148
Emmonak	10,528	22,985	15,215	8,401	12,296	15,568	13,060	11,696	8,097	12,399	9,858	10,310	14,196	10,562
Kodiak	8,825	13,437	13,061	9,105	9,577	7,121	11,197	9,772	12,367	4,803	9,815	4,708	10,188	9,506
Retained From Commercial						249	12,608							
District 1 Subtotal	28,934	52,844	36,999	27,790	33,239	34,285	44,753	34,900	27,289	27,248	26,888	20,169	35,632	29,712
Mountain Village	9,248	15,869	9,950	4,743	7,884	10,505	3,938	10,554	9,285	11,310	9,596	10,059	9,897	8,937
Pitkas Point	2,364	4,175	1,438	1,452	759	1,481	1,103	1,865	1,519	147	1,362	849	1,948	1,287
St. Marys	8,117	8,948	8,077	7,832	7,790	5,925	10,128	5,950	6,738	8,874	9,047	6,752	7,783	8,147
Pilot Station	4,242	6,783	6,898	4,534	6,236	5,641	5,453	4,427	6,359	4,532	5,042	5,285	5,706	5,161
Marshall	4,795	3,927	2,290	2,542	2,076	1,745	2,288	4,594	4,431	1,908	1,263	1,212	2,813	2,523
Retained From Commercial						120	5,745							
District 2 Subtotal	28,787	39,703	28,453	20,703	24,731	25,417	28,852	27,190	28,426	26,971	26,280	24,137	27,946	26,305
Russian Mission	2,794	2,229	2,146	837	3,331	1,838	801	3,853	3,554	585	702	616	2,196	1,859
Holy Cross	3,036	1,753	857	1,028	1,031	1,517	1,479	948	1,700	487	269	264	1,532	877
Shogomuk	8,779	8,942	6,518	3,680	5,267	4,183	6,212	7,542	5,114	9,244	5,501	4,888	6,212	6,923
Retained From Commercial						21	29							
District 3 Subtotal	14,608	12,824	9,521	5,545	9,599	7,559	8,551	12,143	11,368	10,316	6,472	5,748	9,939	9,700
Lower Yukon River Total	72,339	105,371	74,973	54,038	67,569	67,281	81,956	74,323	67,083	64,535	59,640	50,054	73,517	65,825
Amvik	12,607	410	2,032	876	1,142	1,735	927	9	165	6,306	2,139	548	3,134	1,909
Gravling	22,634	14,570	1,430	8,084	3,605	1,137	1,418	3,385	587	2,446	4,032	4,126	8,578	2,374
Katlaq	3,692	602	8,966	2,287	1,204	1,116	3,885	139	31	73	175	625	2,631	820
Nulato	10,201	200	502	159	889	15	975	228	1,003	115	3,518	1,045	1,994	1,168
Koyukuk	284	381	283	2,926	1,130	236	2,030	315	41	739	1,819	197	772	991
Galena	7,413	6,216	1,760	3,493	3,232	2,477	1,198	1,954	3,902	4,575	2,333	1,688	4,089	2,792
Ruby/Kapikines	4,010	1,844	351	1,352	2,420	1,459	4,590	4,445	2,016	3,298	2,251	1,697	1,906	3,317
Retained From Commercial														
District 4 Yukon River Subtotal (Excluding the Koyukuk River)	60,741	24,253	13,314	18,567	13,632	8,169	14,806	10,475	7,765	17,540	16,267	11,126	23,114	13,371
Huslia	14,895	10,005	7,368	7,857	13,679	8,345	6,014	4,885	2,272	940	449	1,192	10,356	2,912
Huachu	2,445	3,687	909	1,257	1,625	827	1,581 d	2,448	1,411	1,579	334	577	1,725	1,471
Alakusok	7,096	2,915 f	5,247	6,451	6,368	2,651	4,693 d	6,396	4,688	3,916	901	2,245	3,557 g	4,115
Atama	1,458	- f	72	962	480	52	365 d	140	209	145	13	88	607 g	174
Bethel	18	75	24	155	37	34	45	740	0	210	82	100	57	215
Koyukuk River Subtotal	25,882	16,682	13,228	16,682	22,190	11,907	12,888	14,000	8,660	6,690	1,779	4,213	16,302	8,857
District 4 Subtotal	86,623	40,935	26,534	35,259	35,812	20,676	27,504	25,084	16,425	24,230	18,046	15,339	41,416	22,258

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Table 5 (page 2 of 2)

Community	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1988-1993 Average	1994-1998 Average
Tanana	13,972	7,756	5,905	2,778	4,553	4,245	7,022	3,080	5,190	2,526	1,986	1,214	6,535	4,073
Rampart	3,393	28	58	20	4,484	1,489	559	1,168	1,188	738	19	60	1,578	724
Fairbanks (i)	0	0	25	1,088	706	405	360	722	2,958	424	57	345	377	904
Sleevens Village	665	2,375	1,571	1,385	480	623	450	150	530	181	171	29	1,225	302
Beaver	214	124	108	2,355	12	134	655	38	572	2	15	91	491	256
Fort Yukon (k)	7,717	1,700	145	11,974	1,700	5,850	2,043	998	26	194	30	0	4,521	545
Circle (j)	742	581	1,262	51	265	83	98	70	271	257	1	60	481	139
Central (j)	129	0	5	0	91	2	8	2	53	25	1	0	45	18
Eagle (j)	1,273	547	361	697	23	32	38	57	105	17	52	271	474	54
Other (j)			187	32	291	24	21	232	618	130	2	42	134	200
Retained From Commercial						159	676							
District 5 Yukon River Subtotal (Excluding Chandalar/Black Rivers)	38,286	12,951	9,727	20,271	12,595	11,116	11,939	7,103	11,509	4,444	2,314	2,110	15,871	7,327
Venette	701	30	0	3,393	0	129	567	552	0	76	0	166	709	239
Chukotik	327	0	90	500	17	0	0	0	0	0	0	0	156	0
Chandalar/Black Rivers Subtotal	1,028	30	90	3,893	17	129	567	552	0	76	0	166	865	239
District 5 Subtotal	39,313	12,981	9,817	24,164	12,612	11,245	12,506	7,655	11,509	4,520	2,314	2,276	16,736	7,566
Manley (j)	3,731	2,457	2,250	1,716	850	1,310	1,405	1,657	1,219	576	211	272	2,052	1,014
Minto (j)	947	1,425	500	748	625	367	509	1,260	1,421	1,056	148	173	709	891
Nenana (j)	5,654	3,988	1,383	1,499	6,372	5,019	1,352	5,043	4,411	1,809	5,041	1,894	3,988	3,549
Fairbanks (i)	0	0	152	1,096	1,342	97	3,693	3,528	392	271	604	315	444	1,688
Other (i)	0	0	0	10	315	0	67	113	43	22	0	0	54	49
Retained From Commercial						5	3,518							
District 6 Tanana River Subtotal	16,332	7,868	4,285	5,098	9,504	6,798	10,544	11,661	7,486	3,824	6,004	2,654	7,309	7,263
Upper Yukon River Total	126,278	81,784	40,636	64,562	57,928	38,119	50,554	44,400	35,420	32,574	26,364	20,269	65,451	37,024
Alaska, Yukon River Total (i)	198,608	167,155	115,609	118,540	125,497	105,380	132,510	116,723	102,505	97,108	86,004	70,323	138,978	102,849
Alaska, Yukon Area Total	229,638	159,490	115,609	118,540	142,192	126,178	147,413	136,083	124,738	112,820	87,368	83,784	156,744	117,163

a. Historic estimated subsistence harvests are available in each year's respective Yukon Area Annual Management Report (1961 to 1998). Beginning in 1988 subsistence salmon harvest estimates have been generated from a stratified random sample of village households. Estimates include test fish catches given away. District 4 summer chum salmon subsistence harvest estimates prior to 1988 and District 5 and 6 prior to 1989 included commercially caught summer chum salmon carcasses retained for subsistence use. Beginning in 1988 and 1989, efforts were made to exclude commercial carcasses from subsistence harvest estimates. Blanks indicate harvest information was not collected.

b. The community was not surveyed; harvest estimates were calculated from calendar and post card replies.

c. Average harvest includes 1988, 1989, 1992 and 1993.

d. Due to floods in 1994, Hughes, Alakapak, and Alaina were not surveyed. The 1994 summer chum salmon harvest is estimated based on a five-year average, 1989-1993.

e. Alaina and Alakapak harvests are combined in 1989.

f. Average harvest includes 1988 and 1990 through 1993.

g. Harvests by Fairbanks subsistence permit holders who fished in District 5 near the Yukon River bridge crossing.

h. In 1988 and 1989, permit and household interview data were expanded for permits not returned. Beginning in 1990, reported harvest is from returned permits only.

i. Includes Birch Creek extent in 1988, 1990 and 1991. A harvest of one summer chum salmon was estimated in 1997.

j. Circle and Central harvests are combined in 1989.

k. Other permit holders who fished in District 5 but did not reside in the villages listed.

l. Average harvest includes 1990 through 1993.

m. Harvests by Fairbanks subsistence permit holders who fished in the Tanana River.

n. Other permit holders who fished in District 6 but did not reside in the villages listed.

o. Does not include the Coastal District.

Appendix 1. Historic Yukon Area Chinook and Summer Chum Salmon Management Actions

YEAR	EVENT
1918	<ul style="list-style-type: none"> First commercial fishery.
1960	<ul style="list-style-type: none"> Harvest quota eliminated.
1961	<ul style="list-style-type: none"> Fishery regulated by scheduled weekly fishing periods with the season opened by a published regulatory date. (1961-1980) Chinook commercial fishing periods 4 days per week in lower Yukon. (1961-1967)
1968	<ul style="list-style-type: none"> Chinook commercial fishing periods reduced to 3.5 days per week in lower Yukon.
1974	<ul style="list-style-type: none"> Chinook commercial fishing periods reduced to 3 days per week in lower Yukon. District 4 was redefined creating Districts 5 and 6. Commercial chinook salmon quotas for Districts 3, 4, 5, and 6 established.
1977	<ul style="list-style-type: none"> Chinook commercial fishing periods reduced to 2.5 days per week in lower Yukon. (1977-1981)
1979	<ul style="list-style-type: none"> Commercial chinook salmon guideline harvest ranges (GHR) replaced quotas. Chinook GHR: District 3 (1,800 – 2,200), District 4 (900 – 1,100), District 5 (2,700 – 3,300), District 6 (900 – 1,100). Anvik River sonar established. (1979-present)
1980	<ul style="list-style-type: none"> Development of chum salmon roe fishery in upper Yukon. Two 48-hour commercial fishing periods per week – District 4 and District 6 (reduced from 5 days per week) 630 hours fished commercially in Districts 1 and 2. Harvest = 136,891 chinook, 691,395 summer chum. Emmonak test fish project initiated.
1981	<ul style="list-style-type: none"> Districts 1 & 2 commercial chinook salmon guideline harvest range established (60,000 – 120,000) District 4 GHR (2,250-2,850), Subdistricts 5-ABC GHR (2,400-2,800), Subdistrict 5-D GHR (300-500), District 6 GHR (600-800). 600 hours fished commercially in Districts 1 and 2. Harvest = 144,521 chinook, 859,087 summer chum. Very early breakup, atypical warm spring and summer.
1982	<ul style="list-style-type: none"> Chinook commercial fishing periods reduced to two 24-hour periods per week in lower Yukon. (1982-1986) DFO initiated mark/recapture study to estimate abundance of chinook and chum salmon entering Canadian portion of the mainstem Yukon River. 492 hours fished commercially in Districts 1 and 2. Harvest = 113,583 chinook, 431,736 summer chum.
1985	<ul style="list-style-type: none"> Regulation eliminated specific dates and implemented emergency order authority for establishing restricted mesh periods in Districts 1, 2, and 3. Board of Fish issued directive to the Department to provide for summer chum salmon directed fishing periods prior to the end of chinook salmon season if summer chum salmon run was average or better in strength. 324 hours fished commercially in Districts 1 and 2. Harvest = 138,376 chinook, 435,585 summer chum. Extremely late ice breakup, cold spring temperatures.
1986	<ul style="list-style-type: none"> Severe flooding on Chena and Salcha Rivers in August. Pilot Station sonar project initiated. (1986-1991, 1993-present) East Fork Andreasky River tower initiated. (1986-1988) 384 hours fished commercially in Districts 1 and 2. Harvest = 94,884 chinook, 669,554 summer chum.

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YEAR	EVENT
1987	<ul style="list-style-type: none"> Commercial fishing periods of 12-hours introduced. Reduced frequency of fishing periods and closed commercial season on July 10 prior to regulatory closure date of July 15 due to low summer chum salmon run size. 276 hours fished commercially in Districts 1 and 2. Harvest = 124,101 chinook, 397,774 summer chum. Large scale illegal salmon and salmon roe sales documented in portions of Districts 5 & 6.
1988	<ul style="list-style-type: none"> Two 42-hour commercial fishing periods per week – District 6 (reduced from two 48-hour periods per week) Extended closed waters area at the mouth of the Andreasky River to enhance summer chum escapement to Andreasky River. 312 hours fished commercially in Districts 1 and 2. Harvest = 92,297 chinook, 1,073,370 summer chum. Manley test fish wheel project initiated. (1988-1994) Nenana test fish wheel project initiated. (1988-1992, 1995-present) Extremely cold 1988-89 winter temperatures for 3-4 weeks beginning January 22, 1989, extended period of high barometric pressure (Omega Block).
1989	<ul style="list-style-type: none"> Commercial fishing periods of 6, 9 and 12-hours implemented. (1989-present) 234 hours fished commercially in Districts 1 and 2. Harvest = 92,378 chinook, 891,593 summer chum.
1990	<ul style="list-style-type: none"> Summer chum salmon guideline harvest ranges established (River-wide 400,000 to 1,200,000) 111 hours fished commercially in Districts 1 and 2. Harvest = 84,374 chinook, 281,418 summer chum. Only 3 fishing periods were allowed with gillnets restricted to 6 inch maximum mesh size. No restricted mesh size fishing periods allowed after June 29. Season closed in July 5 prior to the regulatory closure date of July 15. Near record snowfall for Fairbanks area winter of 1990-91.
1991	<ul style="list-style-type: none"> Delayed season opening in upper Yukon Early season closures due to low summer chum run. 144 hours fished commercially in Districts 1 and 2. Harvest = 92,567 chinook, 313,290 summer chum.
1992	<ul style="list-style-type: none"> 123 hours fished commercially in Districts 1 and 2. Harvest = 110,926 chinook, 324,336 summer chum. Fishing period duration was reduced from 12 hours to 6 hours due to decreasing summer chum salmon abundance. Late ocean ice breakup; cold ocean water temperatures in springtime. Early, heavy snowfall in mid-September, 1992. Near record snowfall for Fairbanks area.
1993	<ul style="list-style-type: none"> Regulations adopted to separate the subsistence and commercial fishing times in Districts 1, 2, and 3 and subdistrict 4-A. (1993-1994) 90 hours fished commercially in Districts 1 and 2. Harvest = 86,579 chinook, 92,991 summer chum. Chena and Salcha River tower projects initiated. (1993-present) Chum salmon returns critically weak. To protect summer chum salmon in lower Yukon, 6-hour unrestricted mesh periods were used and only one commercial period restricted to 6 inch maximum mesh size gillnets was allowed.
1994	<ul style="list-style-type: none"> Anvik River Chum Salmon Management Plan adopted. To protect summer chum salmon in lower Yukon, conservative management allowed only 8-inch or greater mesh size commercial gillnets most of the season and only one commercial period restricted to 6 inch maximum mesh size gillnets was allowed 69 hours fished commercially in Districts 1 and 2. Harvest = 103,933 chinook, 55,201 summer chum. East Fork Andreasky weir, Gisasa weir, Kaltag tower, and Nulato tower projects initiated. Overall good chinook and summer chum salmon escapements in the Yukon area. Severe flooding in Koyukuk River drainage in August.

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YEAR	EVENT
1995	<ul style="list-style-type: none"> Tanana mark/recapture study and Clear Creek tower project initiated. 117 hours fished commercially in Districts 1 and 2. Harvest = 117,436 chinook, 226,083 summer chum. Poor summer chum salmon flesh markets affect lower Yukon Area harvests. Overall good chinook and summer chum salmon escapements in the Yukon area. Very low snow pack through most of Alaskan portion of drainage from November 1995 through February 1996; high overflow and freezing conditions. Very warm weather throughout September and into October 1995, with very high water levels in Delta and Toklat Rivers.
1996	<ul style="list-style-type: none"> Regulations reducing gillnet depth went into effect for lower Yukon. Pilot Station sonar operated for training of personnel. South Fork Koyukuk River and Beaver Creek weir projects initiated. Roe cap of 100,000 lbs. of summer chum salmon roe from Anvik River established. 129 hours fished commercially in Districts 1 and 2. Harvest = 86,851 chinook, 123,233 summer chum. Poor summer chum salmon flesh markets affect lower Yukon Area harvests. Extremely early chinook and summer chum run timing. 5-yr. old chinook make up large portion of the run. Overall good chinook and summer chum salmon escapements in the Yukon area. Relatively low water level in Yukon River mainstem and Delta and Toklat Rivers; warm ocean water temperature anomalies.
1997	<ul style="list-style-type: none"> Ichthyophonus hoferi fish protist in chinook salmon reported in Districts 1-5. 110 hours fished commercially in Districts 1 and 2. Harvest = 105,747 chinook, 78,157 summer chum. Poor summer chum salmon flesh markets affect lower Yukon Area harvests. Extremely low water levels and high water temperature in lower and middle Yukon River tributaries (including Tanana River drainage); warm ocean water temperature anomalies.
1998	<ul style="list-style-type: none"> BOF prohibits the sale of chinook salmon roe in subdistrict 4-A. No commercial periods in the Anvik River management area and District 4. Yukon River declared an economic disaster area due to low chinook returns, and harvests. 60 hours fished commercially in Districts 1 and 2. Harvest = 42,219 chinook, 28,118 summer chum. Chatanika tower project initiated. Increased reports of Ichthyophonus hoferi fish protist in chinook salmon from District 1 through District 5. Extremely unusual chinook salmon run timing and migration entry pattern into the Yukon River. Warm ocean water temperature anomalies; Yukon Territory, Canada, reported extremely low water level and probable higher water temperatures in tributaries during July and August.
1999	<ul style="list-style-type: none"> Federal government assumes control of subsistence fishery management in federal waters on October 1. Chinook and summer chum salmon runs continued to exhibit the decline in productivity observed in recent years. Five and six-year-old chinook salmon abundance was much less than would be expected based on parent year escapements. Summer chum salmon abundance has been below average to poor since 1997, although parent year escapements were very good from 1994 through 1996. 63 hours fished commercially in Districts 1 and 2. Harvest = 64,294 chinook, 27,883 summer chum. Chinook salmon harvest of 69,483 was the third lowest commercial harvest since statehood. No summer chum salmon commercial periods in the Anvik River management area and District 4. Big Eddy drift project, Marshall drift project, and Henshaw Creek tower project initiated. Decreased reports of Ichthyophonus hoferi fish protist in chinook salmon but still prevalent. Cooler ocean water temperatures return, late ocean ice breakup; Yukon Territory, Canada, reported extremely low water level and probable higher water temperatures in tributaries during July and August;

- continued -

YEAR	EVENT
2000	<ul style="list-style-type: none"> • Chinook and summer chum salmon runs continued to exhibit the decline in productivity observed in recent years. • 18 hours fished commercially in Districts 1 and 2. Harvest = 8,518 chinook, 6,624 summer chum. • Lowest commercial chinook salmon harvest since 1937. • Restricted subsistence harvest opportunities for chinook and summer chum salmon. • No commercial periods in District 3 and upper Yukon River districts. • Ichthyophonus hoferi fish protist in chinook salmon still prevalent.

SECTION II

DEVELOPMENT OF MANAGEMENT/ACTION PLAN OPTIONS FOR YUKON RIVER SUMMER CHUM SALMON STOCK OF CONCERN AS OUTLINED IN THE SUSTAINABLE FISHERIES POLICY

SECTION II

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SECTION II

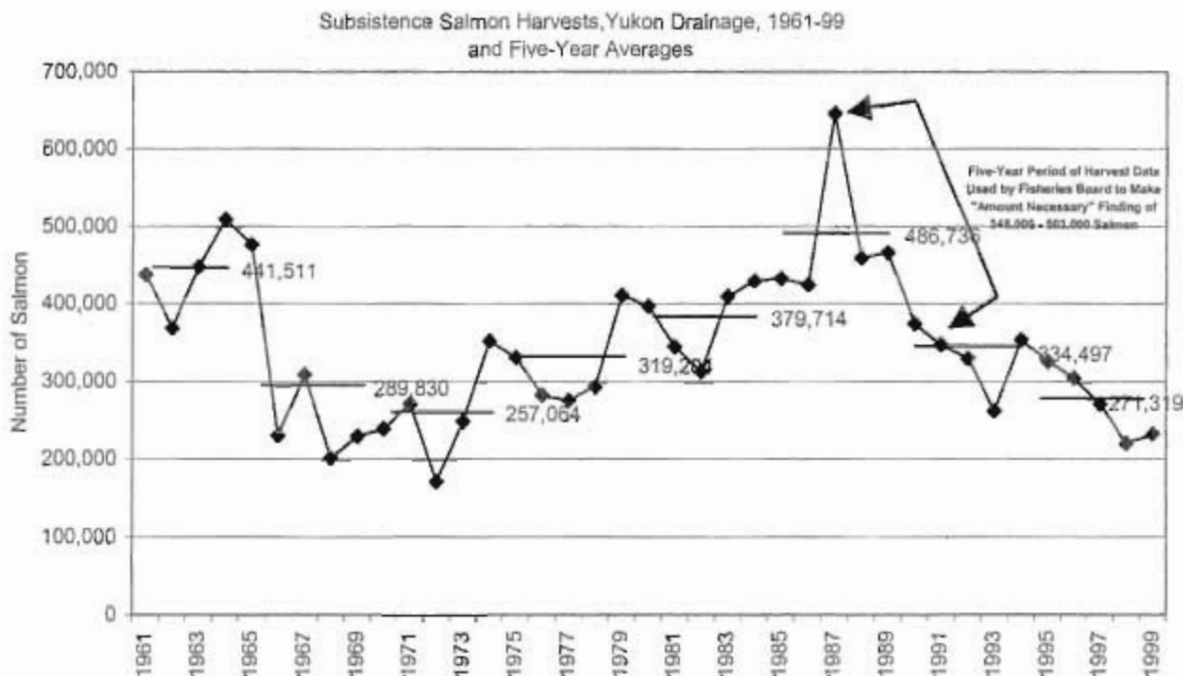
YUKON RIVER SUMMER CHUM SALMON MANAGEMENT PLAN REVIEW/DEVELOPMENT

Current Stock Status

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board of Fisheries classified the Yukon River summer chum salmon stock as a management concern during the September 28-29, 2000 work session. This determination was based on the inability, despite the use of specific management measures, to maintain escapements for the stock within the bounds of the SEG, BEG, or other specified management objectives for the fishery since 1998 and the anticipated low run in 2001.

C&T use finding and the amount necessary

In 1993, the Board of Fisheries made a positive finding for Customary and Traditional Use for all salmon in the Yukon-Northern Area. The Amount Necessary for Subsistence was determined to be 348,000 – 503,000 salmon (all species combined). This ANS finding was based on subsistence harvests from 1987 through 1991.



Revision of Amount Necessary for Subsistence Finding

The department recommends that the Board amend 5 AAC 01.236 to include a revised finding of the amount necessary for subsistence (ANS) for the Yukon Area using updated subsistence harvest data. In establishing the ANS range, the Board should use harvest information that represents the pattern of use in the subsistence fishery. One approach that may capture the dynamic pattern of use within the recent decade is to use the low and mean subsistence harvests for the most recent ten years, rounded down to the nearest 500 fish for the low, and rounded up to the nearest 500 fish for the high. In some years, larger portions of subsistence harvests are met by utilizing carcasses available from commercial

fishing, primarily chum salmon in Districts 4, 5, and 6, and are not reflected in the following tables used to calculate ANS. The Board may also consider amending 5 AAC 01.236 to include a finding of the ANS for the Yukon Area, by species, and/or by district or district groups.

Objective

The objective of this recommendation is to reevaluate the previous Board's ANS finding in the Yukon Area using updated harvest information and a broader range of data to better represent the pattern and level of use in the subsistence fishery.

Options for defining the Amount Necessary for Subsistence range

In amending 5 AAC 01.236 to define the ANS range for the Yukon Area, the following options may be considered:

Option A.

Status Quo. The current ANS range for the Yukon-Northern Area (348,000 – 503,000 salmon) is not amended.

The department does not recommend this option. The ANS finding for Yukon Area salmon made in February 1993 was based on inaccurate subsistence harvest information. At that time, the subsistence harvests included salmon carcasses left over from commercial roe sales and some harvests of illegally-sold commercial fish. Therefore the subsistence harvest information resulted in an inflated ANS that is greater than actual subsistence harvest patterns. The department revised the subsistence harvest survey methodology starting in 1989 to be able to determine other sources of fish available for subsistence uses. Utilizing revised subsistence harvest data would aid in developing an ANS that more accurately depicts the amount necessary for subsistence. Maintaining the status quo may prematurely trigger a Tier II permit system for the Yukon Area because the current ANS is based on inaccurate, inflated subsistence harvests.

(The following table is used to calculate ANS range for options B & C)

Yukon River Subsistence Salmon Harvests, Coastal District and Districts 1-6, 1990-99

<u>Year</u>	<u>Chinook</u>	<u>Summer Chum</u>	<u>Fall Chum</u>	<u>Coho</u>	<u>Total salmon</u>
1990	48,587	115,609	167,900	43,460	375,556
1991	46,773	118,540	145,524	37,388	348,225
1992	47,077	142,192	107,808	51,980	349,057
1993	66,704	125,574	76,882	15,812	284,972
1994	55,388	124,807	123,565	41,775	345,535
1995	50,620	136,083	130,860	28,377	345,940
1996	45,669	124,735	129,258	30,404	330,066
1997	57,117	112,820	95,141	23,945	289,023
1998	54,124	87,366	62,901	18,121	222,512
1999	53,132	83,784	89,938	20,885	247,739
Max 1990-99	66,704	142,192	167,900*	51,980*	375,556*
Min 1990-99	45,669	83,784	89,938*	20,885*	247,739*
Mean 1990-99	52,519	117,151	123,749*	34,777*	313,863*

**Excluding harvests in 1993 and 1998 because regulations restricted subsistence harvests*

Option B.

Establish the ANS range for the Yukon River drainage, all species combined, using updated harvest information and a broader range of data: **247,500 – 314,000 salmon.**

Option C.

Establish the ANS range for the Yukon River drainage by species.

- Chinook salmon: 45,500 – 52,500
 - Summer chum salmon: 83,500 – 117,500
 - Fall chum salmon: 89,500 – 124,000
 - Coho salmon: 20,500 – 35,000
- Total salmon: 239,000 – 329,000

- Other grouping: Combine fall chum and coho salmon option, because they overlap in run timing and are inseparable by the majority of gear types used, thus management actions taken for one species greatly affects the other species.

(The following table is used to calculate ANS range for option D)

Yukon River Subsistence Salmon Harvests, 1990-99

ALL SALMON				
Year	Coastal & Districts 1-3	District 4	District 5	District 6
1990	119,480	60,511	126,481	69,084
1991	87,390	71,695	119,526	69,614
1992	131,704	73,764	88,380	55,209
1993	134,379	43,989	82,945	23,659
1994	118,953	54,874	102,028	69,680
1995	129,661	50,549	84,320	81,410
1996	128,875	43,871	97,297	60,023
1997	118,208	51,724	81,410	37,681
1998	97,061	44,338	51,348	29,765
1999	106,371	37,800	74,427	29,141
Max 1990-99*	131,704	73,764	126,481	81,410
Min 1990-99*	87,390	37,800	74,427	29,141
Mean 1990-99*	117,580	55,599	96,734	58,980

*Excluding harvests in 1993 and 1998 because regulations restricted subsistence harvests

Option D.

Establish the ANS range by Yukon River district or district groupings for all salmon combined:

1. Coastal District & Districts 1-3: 87,000 – 118,000 salmon
 2. District 4: 37,500 – 56,000 salmon
 3. District 5: 74,000 – 97,000 salmon
 4. District 6: 29,000 – 59,000 salmon
- Total salmon: 227,500 – 330,000

5. Other grouping.

(The following table is used to calculate ANS range for option E)

Subsistence Salmon Harvests, Yukon Area Districts, 1990-99 Mean, Maximum, and Minimum

		<u>Coastal</u>	<u>District 1</u>	<u>District 2</u>	<u>District 3</u>	<u>Coastal, Districts 1-3</u>	<u>District 4</u>	<u>District 5</u>	<u>District 6</u>	<u>Total River</u>
Chinook	Max 1990-99	2,363	10,423	11,516	7,715	29,970	15,801	22,111	2,712	66,704
Chinook	Min 1990-99	391	3,646	7,074	3,187	16,729	8,193	14,330	1,177	45,669
Chinook	Mean 1990-99	1,328	6,601	9,085	5,576	22,324	10,967	17,022	2,206	52,519
Summer Chum	Max 1990-99	22,235	36,999	28,453	12,143	91,683	35,812	24,164	11,661	142,192
Summer Chum	Min 1990-99	1,362	20,169	20,703	5,545	54,038	15,339	2,276	2,654	83,784
Summer Chum	Mean 1990-99	15,316	30,074	25,510	8,674	79,510	24,432	9,778	6,431	117,151
Fall Chum	Max 1990-99	392	7,770	7,382	2,706	15,162	21,232	90,513	49,168	167,900
Fall Chum	Min 1990-99*	0	3,132	3,094	415	8,599	7,898	31,393	9,853	89,938
Fall Chum	Mean 1990-99*	207	4,879	4,880	1,448	11,373	14,515	58,167	28,922	123,749
Coho	Max 1990-99	349	5,426	6,587	1,549	13,621	8,429	12,376	26,489	51,980
Coho	Min 1990-99*	0	1,730	1,695	279	4,357	1,167	2,205	4,304	20,885
Coho	Mean 1990-99*	105	2,657	3,494	767	7,001	3,397	5,848	14,968	34,777

Source: Annual harvest surveys and permits, ADF&G

*Excluding harvests in 1993 and 1998 in Districts 4-6 because regulations restricted subsistence harvests.

Ranges for Discussion of Amount Necessary for Subsistence (ANS)*

		<u>Coastal</u>	<u>District 1</u>	<u>District 2</u>	<u>District 3</u>	<u>Coastal, Districts 1-3</u>	<u>District 4</u>	<u>District 5</u>	<u>District 6</u>	<u>Total River</u>
Chinook	Low Range	350	3,500	7,000	3,000	16,500	8,000	14,000	1,000	45,500
Chinook	High Range	11,500	7,000	9,000	5,500	22,500	11,000	17,500	2,500	52,500
Summer Chum	Low Range	1,000	20,000	20,500	5,500	54,000	15,000	2,000	2,500	83,000
Summer Chum	High Range	15,500	30,500	26,500	9,000	76,500	24,500	10,000	6,500	117,500
Fall Chum	Low Range	0	3,000	3,000	500	8,500	7,500	31,000	9,500	89,500
Fall Chum	High Range	200	5,000	5,000	1,500	11,500	15,000	58,500	29,000	124,000
Coho	Low Range	0	1,500	1,500	500	4,000	1,000	2,000	4,000	20,500
Coho	High Range	100	3,000	3,500	1,000	7,000	3,500	6,000	15,000	35,000

* Rounding Min 1990-99 down to nearest 500 salmon for low range and rounding Mean 1990-99 up to nearest 500 salmon for high range.

Option E.

Establish the ANS range by Yukon River district or district groupings for each species.

1. Coastal District and Districts 1-3
 - Chinook salmon: 16,500 – 22,500
 - Summer chum salmon: 54,000 – 76,500
 - Fall chum salmon: 8,500 – 11,500
 - Coho salmon: 4,000 – 7,000
2. District 4
 - Chinook salmon: 8,000 – 11,000
 - Summer chum salmon: 15,000 – 24,500
 - Fall chum salmon: 7,500 – 15,000
 - Coho salmon: 1,000 – 3,500
3. District 5
 - Chinook salmon: 14,000 – 17,500
 - Summer chum salmon: 2,000 – 10,000
 - Fall chum salmon: 31,000 – 58,500

o Coho salmon:	2,000 – 6,000
4. District 6	
o Chinook salmon:	1,000 – 2,500
o Summer chum salmon:	2,500 – 6,500
o Fall chum salmon:	9,500 – 9,000
o Coho salmon:	<u>4,000 – 15,000</u>
Total salmon:	180,500 – 316,500

5. Other grouping: Combine fall chum and coho salmon option, because they overlap in run timing and are inseparable by the majority of gear types used, thus management actions taken for one species greatly affects the other species.

Option F.

Establish an ANS range for subsistence harvests for human consumption and an ANS range for subsistence harvests for transportation (dog food).

The department does not recommend this option for summer chum salmon. Of the annual subsistence harvest from 1990–99, 35% of summer chum salmon was used for dog food compared to 75% of fall chum salmon and 69% of coho salmon. This option may be more appropriate for fall chum salmon.

Benefits of the various options

Options B and C: An ANS range for the entire drainage provides the department a realistic goal that can be managed for in the absence of inseason subsistence harvest information.

Options B and D: An ANS finding grouping all salmon takes into account that households substitute among species. Grouping of species might avoid a Tier II permit system for a particular species if low harvests are being supplemented by other species.

Options C to E: An ANS range specific to the stock of concern and/or district grouping provides indices for measuring the extent to which reasonable opportunity was provided in the subsistence fishery, using postseason harvest data. A harvest above the lower bound of the ANS range indicates that there was a reasonable opportunity for subsistence uses during the previous season in the area. Harvests below the lower bound of the ANS may indicate, with other evidence, that there was not a reasonable opportunity for subsistence uses during the previous season in the area. Harvests consistently below the lower bound of the ANS directs the board to consider whether additional actions, such as establishing regulations for Tier II management actions, are necessary.

Options D and E: An ANS range specific to a district or district grouping allows for coarse management actions within that district or district grouping, without involving other areas where there may or may not be management problems. For example, a Tier II permit system might be established within one district with chronically depressed harvests to allocate harvests among subsistence households while leaving harvests in other districts without problems on a Tier I system. Grouping Coastal District and

Districts 1-3 reflect the shared gear and harvest patterns in these districts. Some families live in one district but fish in another district within the lower river.

Option E: This option requires the most refinement of findings. This level of detail may provide a measure of reasonable opportunity for each species by district or district grouping using postseason subsistence harvest data.

Detriments of the various options

All Options: If the ANS range is not set to appropriately represent the normal between-year fluctuations in subsistence harvests, a Tier II fishery may be unnecessarily triggered, thus reducing subsistence opportunity for subsistence users.

Options A, B and D: An ANS finding for all salmon grouped together may not allow for measuring reasonable opportunity directed toward a specific stock of concern. Reasonable opportunity for subsistence would continue to be measured by harvests of a mixed set of stocks.

Options D and E: Although the ranges are not designed for inseason management, establishing ANS by district or district groupings may create unrealistic management goals because the subsistence harvest is unknown inseason. The department cannot manage for a specific level by district inseason. Measurement of success of meeting management objectives within a district can only be accomplished using postseason harvest assessments.

Preferred Option

Option C: The department prefers the Board establish an ANS range by species for the entire Yukon River using the low and mean subsistence harvests for the most recent ten years, rounded down to the nearest 500 fish for the low, and rounded up to the nearest 500 fish for the high.

Establishing an ANS range for the entire river would be less complicated than the other options. The department cannot manage for an ANS range by district in the absence of inseason subsistence harvest information. Measuring success of providing reasonable opportunity can only be accomplished using postseason harvest information. In the absence of commercial fishing, the Yukon River district boundaries that were established for commercial fishing have less application for subsistence guidelines.

Habitat Factors Adversely Affecting The Stock

Yukon River salmon stocks have generally remained healthy due primarily to undisturbed spawning, rearing, and migration habitat although there are some habitat issues adversely impacting the production of salmon in the Yukon River drainage. A detailed discussion of these issues is found in the Yukon River Comprehensive Salmon Plan for Alaska (1998). This plan discusses mining, logging, and flood control (with these topics briefly discussed below) as well as potential pollution and habitat changes related to urban development, rural sanitation, increased traffic along tributaries, and agriculture.

Mining

The first habitat threats to salmon that were caused by human presence in the Yukon River drainage began in the early 1900s with mine exploration and development. Mining activity was, and continues to be, an important economic industry within the drainage. Fortunately, most historical mining activity occurred on localized, discrete, headwater streams using manual labor that helped to minimize impacts on spawning habitat. However, in the 1920s mining practices expanded to include use of hydraulic mining methods and large scale dredges. Both of these mining practices disturbed extensive acreage, much of which remains un-reclaimed today. Hydraulic mining methods in particular, washed large quantities of overburden and fine sediment into downstream spawning and rearing habitats. A thorough discussion of mining activity and salmon presence in the Yukon River Area can be found in the report entitled "A History of Mining in the Yukon River Basin of Alaska" (Higgs, 1995). As is noted in the report, major mining activity has occurred on the following tributaries: the Iditarod, and Innoko River drainages in the Lower Yukon; American Creek, Eureka Creek, Minook Creek, and upper Sulatna River in the Middle Yukon; Birch Creek, Woodchopper Creek, Coal Creek, Nome Creek, Beaver Creek, and the Fortymile River in the Upper Yukon; Middle and South Forks of the Koyukuk River and Hogatza River in the Koyukuk River drainage; and Goldstream Creek, Chatanika River, Chena River, Livengood Creek, Salcha River, Goodpasture River, in the Tanana River drainage. Northern mining operations had to cope with short operating seasons, difficult transportation conditions, and high freight and labor costs. Both small and large mining operations exist today. However, more rigid enforcement of environmental regulations since the mid-1980s, has resulted in mining operations which are far less detrimental to fisheries habitat than in the past. Today, all mining operations must obtain numerous environmental permits prior to initiating or continuing mining activity. Wastewater discharge must comply with Alaska's Water Quality Standards and all mines permitted since October 14, 1991 must comply with Alaska's Mining Reclamation Regulations. Currently, two large hard rock mines are operating; the Illinois Creek mine in the Upper Innoko drainage and the Fort Knox mine near Fairbanks with a third being assessed for development near Pogo Creek of the Goodpasture River near Delta. Additional satellite hard rock mines are under assessment at Fort Knox for the Gil, Ryan Lode, and True North deposits. Some of these mines are located in potential acid-generating deposits for which strict wastewater controls will be necessary.

Logging

Logging has become a potential threat to fisheries habitat in the Tanana River drainage. With the transfer of large tracts of federal land into private native corporation and state ownership, logging activity is increasing to meet both local and export timber demands. Current concerns relate to insufficient buffer or setback zones to protect tributaries from increased runoff, increased temperature fluctuations, loss of spawning and rearing habitat, increased siltation and turbidity, and other effects which can all be stabilized or moderated with sufficient streamside vegetation. Riparian buffer standards have been developed by a Region III Forestry/Fisheries Science and Technical Committee and await statutory enactment by the Alaska Legislature.

Flood Control and Other Dams

Chena River Lakes Flood Control Project: ADF&G, YRDFA, and local sport and subsistence fishermen have raised concerns about the dam's effects on springtime emigration of salmon fry and immigration of adults. In flood years such as 1985, 1991, and 1992, the dam's gates were closed to slow the Chena River's flow to manageable levels. This caused the river to back up and spread throughout the willow and spruce brush in the Chena River valley floodway. In some of these flood event years, seagulls and other birds were seen feeding off salmon fry at several locations. Three locations noted were; above the dam in the backed up waters, below the dam's chutes where smolt were dumped via small waterfalls, and in pools of water above the dam when the flood waters receded. The exact effects of these events upon salmon returns are unknown.

Chatanika River (Davidson Ditch) Dam: The dam was severely damaged by the 1967 flood, with the top half destroyed and washed downstream. The remainder is a sheet pile structure approximately 100 feet (30 m) long and 4 feet (1.2 m) high and blocks the entire river channel. The flow diversion gates are inoperable and the overflow apron has been completely removed by ice and flood waters. The dam has trapped sediment behind it since its construction and is believed to be a barrier to upstream fish migration. Only two species of fish (Arctic grayling and sculpin) are documented above the dam (Al Townsend, ADF&G, Fairbanks, personal communication). Three species of salmon (chinook, chum, and coho salmon), three species of whitefish, sheefish, Arctic grayling, northern pike, burbot, suckers, and sculpin are documented in the Chatanika River downstream of the dam.¹

Habitat Projects Needed

1. Continued monitoring of Illinois Creek Mine in the Innoko River drainage.
2. Continued restoration of Birch Creek and enhancements to allow fish passage in historical mining areas. Restoration of Birch Creek tributaries whose fish habitat still remains highly impaired due to mining. Much of this mining predated the 1991 Mining Reclamation Regulations.
3. Continued restoration of Nome Creek from damage due to historic mining.
4. Continued evaluation, and possibly implementation, of modifications to the Chena River Lakes Flood Control Project to reduce salmon mortality.
5. Removal of Chatanika River Dam or construction of a bypass channel around the dam.
6. Survey and assessment of critical salmon spawning and rearing habitats in the Tanana River drainage. Continued restoration of Tanana River tributaries from historic mining damage.
7. Advanced identification of previously undocumented anadromous fish streams in the Yukon Watershed. An estimated 50% of all waterbodies in the Yukon watershed

¹ Literature sources:

Townsend, Alan H. 2000. Personal communication. Alaska Department of Fish and Game, Fairbanks.

Higgs, Andrew S. 1995. A history of mining in the Yukon River Basin of Alaska. Northern Land Use Research, Inc. Fairbanks, AK.

Holder, R.R. and D. Senecal-Albrecht, compilers. 1998. Yukon River comprehensive salmon plan for Alaska. Alaska Department of Fish and Game. 162 pp.

have not been evaluated for distribution of anadromous species. An estimated 70% of the first and second order tributaries similarly have not been surveyed. Consequently these streams are not afforded legal protection under ADF&G's AS 16.05.870 permitting program.

Do New Or Expanding Fisheries On This Stock Exist?

There are no new or expanding fisheries on this stock. However, several proposals before the Board of Fisheries would increase subsistence fishing time in particular areas or allow the use of new subsistence fishing gear types potentially effecting historic harvest levels. The issues to be debated during Yukon River summer chum salmon stock of concern discussions include the following by proposal number: 120, 134, 157, 158, 159, 161, 162, 163, 164, 167, 168, 169, 178, 179, and 181.

Draft Yukon River Summer Chum Salmon Management Plan

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the department recommended to the Board of Fisheries during the November 4-6, 2000 work session that elements of existing regulations and management strategies be incorporated in the present management plan. The added sections (Underlined) are similar to some sections already used in the Yukon River Fall Chum Management Plan and reflect current management strategies during the summer season.

5 AAC 05.362. YUKON RIVER SUMMER CHUM SALMON MANAGEMENT PLAN; FISHERMEN REPORTING REQUIREMENTS.

The objective of the management plan contained in this section is to provide for the sustained yield of the Yukon River summer chum salmon resource and to provide management guidelines to the department. The commissioner shall implement this plan during the summer chum salmon fishing season each year, as follows:

The department shall use the best available data, including preseason projections, test fisheries indices, age and sex composition, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size for the purpose of implementing this plan:

(a) The department shall manage the Yukon River summer chum salmon fishery in accordance with the following guidelines:

(1) manage the commercial fishery during the summer chum salmon season for a guideline harvest range of 400,000 - 1,200,000 summer chum salmon, distributed as follows:

(A) Districts 1 and 2: 251,000 - 755,000 summer chum salmon;

(B) District 3: 6,000 - 19,000 summer chum salmon;

(C) Subdistrict 4-A: 113,000 - 338,000 summer chum salmon or the equivalent roe poundage of 61,000 - 183,000 pounds or some combination of numbers of fish and pounds of roe;

(D) Subdistricts 4-B and 4-C: 16,000 - 47,000 summer chum salmon;

(E) Subdistricts 5-B, 5-C, and 5-D: 1,000 - 3,000 summer chum salmon;

(F) District 6: 13,000 - 38,000 summer chum salmon;

(2) except as provided in 5 AAC 05.368, no more than 183,000 pounds of summer chum salmon roe from catches in Subdistrict 4-A may be sold annually; if this roe cap is reached, fishing effort may continue, but only the sale of chum salmon in the round is allowed.

(b) All salmon caught by CFEC permit holders during commercial periods in Subdistrict 4-A shall be reported in numbers on fish tickets. Fish taken from commercial catches in Subdistrict 4-A and used for subsistence purposes shall be reported in the commercial catch.

(c) When the commercial harvest is expected to fall below the guideline harvest range, the department shall endeavor to manage so that each district's harvest is proportionally similar to their respective guideline harvest range.

Escapement goal review

The Department is undertaking a review of escapement goals for several Yukon River summer chum salmon stocks where long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals based on analysis of production consistent with the Department's escapement goal policy. The intent of the review is to recommend scientifically defensible biological escapement goals for these stocks. A detailed report will be published for these stocks, documenting the available data, methods for reconstruction of long-term age specific runs and recruits from parent escapement, estimation and analyses of the relationship between parent spawning stock and recruitment, and recommended biological escapement goals. These reports will be prepared and, following an internal review and approval by the AYK Biological Escapement Goal review committee, will be provided for public review.

At this time, the public review draft of Anvik River and Andreafsky River chum salmon has been prepared and reviewed by the AYK BEG review committee. New biological escapement goals will be recommended for Anvik River chum salmon. In addition, the AYK BEG review committee recommends that Yukon River summer chum salmon BEG's within the Yukon River drainage based on aerial survey counts of spawning salmon be dropped in lieu of establishing BEG's for Anvik, Andreafsky, and non-Anvik River summer chum salmon above Pilot Station.

An additional report for the non-Anvik River summer chum salmon stocks above Pilot Station is in preparation.

List of current and proposed BEG, or SEG's for stock.

Stream	Current Goal	Proposed Goal
East Fork Andreafsky River Aerial	> 109,000 BEG	35,000 – 70,000 BEG
East Fork Andreafsky River Weir		65,000 – 135,000 BEG
West Fork Andreafsky River Aerial	> 116,000 BEG	35,000 – 70,000 BEG
West Fork Andreafsky River Weir		65,000 – 135,000 BEG
Anvik River Sonar	> 500,000 BEG	400,000 – 800,000 BEG
Nulato River Aerial	> 53,000 BEG	Eliminate current goal
Clear Creek and Caribou Creek Aerial	> 17,000 BEG	Eliminate current goal
Salcha River Index Aerial	> 3,500 BEG	Eliminate current goal
Drainage-wide Escapement (Above Pilot Station)		800,000 – 1,600,000

Identify Research On Yukon River Summer Chum Salmon Stock

At this time, the Yukon River does not have a comprehensive research plan similar to the plan that has been developed for the Copper River and is being developed for the Kuskokwim River. Attachment (1) provides a list of past, current, and proposed projects that have collected data pertaining to Yukon River summer chum salmon.

ACTION PLAN DEVELOPMENT

Yukon River Summer Chum Salmon Rebuilding Goal

Reduce fishing mortality in order to meet spawning escapement goals, to provide for subsistence levels within the ANS range, and to reestablish historic range of harvests levels by other users.

Action Plan Alternatives

ACTION #1.

Amend 5AAC 05.310(1) to delete reference to dates and open commercial fishery by emergency order.

Objective

The objective of this recommended action is of a housekeeping nature designed to correspond with current management practices which open the commercial fishing season based on run timing and avoid unnecessary closures to subsistence fishing.

Specific action recommended to implement the objective

Amend the existing regulation to delete reference to dates, which would correspond with current management practices that open the commercial fishery based on run timing and not on a range of calendar dates.

Benefits

The recommended action would avoid unnecessary closures to subsistence fishing.

Detriments

There appears to be no detriments associated with the recommended action.

Subsistence issues/considerations

The recommended action is consistent with state subsistence law requirements and would benefit subsistence fishers by eliminating unnecessary subsistence fishing closures.

Performance measures

Performance measures are not applicable to this proposed action.

Research plan to address stock of concern

A research plan is not applicable to this proposed action.

ACTION #2.

When very low runs occur or are anticipated, determine when commercial, sport, and personal use fisheries are closed in relation to one another (Related proposal #120).

Objective

Develop a policy or regulation that would inform the public and the department the appropriate management actions to take by fishery during a very poor run.

Specific action recommended to implement the objective

Determine when commercial, sport, and personal use fisheries are closed in relation to one another. Take appropriate action to limit sport fish and personal use harvests (fishing time, reduce bag limits, catch and release, closure) of summer chum salmon when the commercial fishery is closed to conserve summer chum salmon. Appropriate action could depend on whether commercial fishing is closed for an extended period of time or for the season.

Benefits

The general public, commercial fishers, subsistence fishers, sport fishers, sport fishing guides, and personal use fishers are informed when and why management actions are to be taken. The department is provided guidelines as to how to manage the various fisheries of equal priority in the Yukon River drainage.

Detriments

Sport fishing guides could be adversely affected if their ability to attract clients is diminished by closure or restriction of sport fishing opportunities.

Subsistence issues/considerations

Summer chum salmon harvest by any one of these uses (commercial, sport, and personal use) during a very low run may affect the reasonable opportunity of subsistence fishers.

Performance measures

Performance measures are not applicable to this proposed action.

Research plan to address stock of concern

A research plan is not applicable to this proposed action.

ACTION #3.

When the preseason projection is for very low runs and commercial fishing is likely to remain closed, reduce subsistence fishing time early in the run to help ensure that subsistence harvests do not impair meeting escapement needs or reasonable opportunity for all subsistence users. (Related proposal #157)

Objectives

Reduce harvest early in the run when there is a much higher level of uncertainty in projecting total run abundance, spread the harvest throughout the run to reduce the impact on any particular component of the run, and spread subsistence harvest opportunity among users.

Specific action recommended to implement the objective

Yukon River Drainage Fisheries Association (YRDFA), Fish and Game Advisory Committees, and Regional Advisory Councils will be used by the department to gather information for establishing what is reasonable subsistence fishing opportunity relative to run size for different areas/districts/subdistricts. To spread harvest opportunity among all subsistence users, management of the subsistence fishery would use time and/or area and gear restrictions to provide for opportunity throughout the drainage while allowing summer chum salmon to pass through districts and meet escapement goals. Management would establish subsistence fishing periods, and implement gear specifications by emergency order based upon inseason run assessment (lower river test fish indices and escapement projects) and reasonable opportunity as developed through the Board and public process.

Example of the subsistence fishing schedule implemented on July 19 2000.	
District	Sample Fishing Schedule
Y-1, Y-2, Y-3	one 12-hour period/week
Y-4	two 24-hour periods/week
Y-5A, Y-5B, Y-5C	two 12-hour periods/week
Y-5D	one 24-hour period/week
Y-6	one 18-hour period/week

A subsistence fishing schedule should take into account the relative efficiency of subsistence fishing gear used in the area with consideration for the species to be conserved. Based on run assessment information, fishing time would be allowed proportionally based on what is defined as reasonable subsistence fishing opportunity relative to run size for different areas/districts/subdistricts.

Inseason summer chum salmon run assessment will be based on lower river test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. Lower river test fish indices provide inseason data on relative abundance and run timing, which is compared to test fish indices from other similar years in addition to results from fishery performance and escapement. The department will participate in Yukon River Drainage Fisheries Association and Federal Yukon River Coordinating Fisheries Committee teleconferences inseason to gather information from the public and to discuss run status and management actions.

Benefits

Salmon run outlooks in the Yukon River are qualitative in nature due to the lack of adequate information with which to develop more rigorous forecasts. Consequently, the harvest outlooks are qualitative and typically based upon available parent year spawning escapement indicators, age composition information, and the likely level of harvest that can be expected to be available from such indicators. While the harvest outlooks provide for a general level of expectation, the fisheries are managed based upon inseason assessments of the actual runs. When a very poor run is projected and commercial fishing is likely to be closed, there is the potential that typical subsistence harvests may not provide for adequate spawning escapements. Managing the subsistence fishery using similar strategies developed for the commercial fisheries under such circumstances would provide the flexibility necessary to react in a timely manner to inseason run assessment information.

Based on preseason or inseason run projections, when it appears that there will be a surplus for commercial fishing, subsistence fishing restrictions can be relaxed without having to go through a lengthy Board process.

Detriments

Currently subsistence harvest levels cannot be determined inseason. Management of the subsistence fishery could be overly restrictive or too lenient prior to obtaining complete run abundance information. Subsistence fishermen could be required to forego a surplus that was not identified until it had already passed through their area or the harvest of fish needed for escapement may occur.

Subsistence issues/considerations

Potential subsistence harvest allocation issues may arise in trying to establish an equitable subsistence fishing schedule.

Performance measures

Subsistence harvest levels would continue to be determined postseason through the Yukon Area subsistence survey and fishing permit program. The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars or subsistence fishing permits. Postseason surveys are voluntary, and they are used by the department to collect harvest information from a large number of households within the drainage. A postseason analysis of subsistence salmon harvests will be conducted to determine if the objective was achieved.

Another measure of performance would be meeting established summer chum salmon escapement goals. Additional measures of performance could not be obtained due to the lack of reporting requirements for subsistence fishermen. The objective of the action would be met by preventing salmon from being caught continuously and spreading the harvest by regulating fishing time. Allowing pulses of fish to move through various areas while controlling fishing time would be a qualitative measure.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

ACTION #4.

Manage summer chum salmon fisheries based on in-river run goals.

Objective

To ensure adequate escapement of summer chum salmon into the Yukon River drainage and provide management guidelines to the department.

Specific action recommended to implement the objective

Begin development of a management plan similar to the Yukon River Drainage Fall Chum Salmon Management Plan that stipulates levels of summer chum salmon run projections that would be necessary to provide for escapement and typical levels of harvests from subsistence, commercial, sport, and personal use fisheries. The plan would outline triggers at which restrictions and/or closures of the various fisheries may need to be implemented in order to meet escapement objectives.

The fall chum salmon management plan took years to develop and has many levels at which certain management actions take effect. Summer chum salmon are classified as a management concern; therefore it is prudent to initiate a summer chum salmon management plan that establishes some basic levels of inseason run projections that would serve as a basis for management actions. However, it is recommended that YRDFA be given a charge to work with the department, Fish and Game Advisory Committees, and Regional Advisory Councils to fully develop a more comprehensive plan for the next BOF cycle.

At this time, it is recommended that a basic management plan provide for escapement and subsistence harvest opportunity. Additionally, establishing triggers would indicate when commercial harvest may be directed to summer chum salmon, limited to an incidental catch while targeting chinook salmon, or closed. These triggers would also establish what actions are to be taken in the other fisheries (sport, personal use, and subsistence). The department and the public must review Pilot Station sonar passage estimates, run timing of various stocks, subsistence and commercial harvest data, and impacts on tributary fisheries (Anvik, Koyukuk, and Tanana) to determine if more specific triggers are needed.

The Board may choose to establish an OEG as was done in the fall chum salmon management plan. The department has managed for an in-river run of at least one million summer chum prior to opening directed summer chum salmon commercial fishing during recent years.

The department recommends an initial plan contain the following elements:

1. When the projected run size is (Example: <700,000)
 - a. All directed summer chum salmon fishing would be closed to provide for spawning escapement.
2. When the projected run size is (Example: 700,000 – 900,000)
 - a. No directed commercial summer chum salmon fishery.
 - b. Department may implement subsistence fishing restrictions in a progressive manner depending on where the projected run size falls within this range

- c. Appropriate actions taken in sport and personal use fisheries.
- 3. When the projected run size is (Example: >1,000,000)
 - a. May have directed commercial summer chum salmon fishing.
- 4. If indicators suggest that an individual escapement goal in a subdistrict or district, or a portion of a subdistrict or district will be achieved, a subsistence directed summer chum salmon fishery in that subdistrict or district, or a portion of a subdistrict or district may occur.

The department shall use the best available data, including preseason projections, mainstem river sonar passage estimates, test fishery indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size for the purpose of managing the summer chum salmon fisheries.

Benefits

A summer chum salmon management plan would provide direction to the department and clarification to the public regarding the run strength levels at which various management actions would occur. The public would better understand, and have input into developing, the management triggers for summer chum salmon. In particular the plan could clarify the interaction between chinook salmon and summer chum salmon management at various run strengths.

Detriments

It is difficult to construct a management plan that gives adequate direction without denying the department necessary flexibility. In order to do this, the plan must recognize the interaction between fisheries for chinook and summer chum salmon including the variables of run strength, run timing, gear selectivity, markets, and subsistence needs.

Subsistence issues/considerations

A management plan should consider the requirements for subsistence and integrate the subsistence fisheries into the overall management of the stock. This is illustrated very effectively in the fall chum salmon management plan and could be prepared for summer chum salmon as well.

Performance measures

Subsistence harvest levels would continue to be determined postseason through the Yukon Area subsistence survey and fishing permit program. The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars or subsistence fishing permits. Postseason surveys are voluntary, and they are used by the department to collect harvest information from a large number of households within the drainage. A postseason analysis of subsistence salmon harvests will be conducted to determine if the objective was achieved. Another measure of performance would be meeting established summer chum salmon escapement goals.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action. Research needs include continued evaluation of the following: summer chum salmon escapement needs, the relationship between run timing and spawning distribution of stocks, and inseason escapement monitoring. Inseason management according to a plan

similar to fall chum salmon management plan will require usage of Pilot Station sonar passage estimates as a measure of inseason run strength. Research will need to be conducted to establish what level of sonar passage at Pilot Station is required in order to ensure adequate spawning escapement throughout the drainage and that surplus fish are foremost provided for subsistence harvest and, secondarily, for commercial, sport, and personal use.

ACTION #5.

Amend or adopt regulations creating a Tier II subsistence fishery and Tier II permit scoring system for the stock of concern, or segments of a stock of concern, when there is a chronic inability of subsistence harvests to meet the lower bounds of the Amount Necessary for Subsistence (ANS) range established by the Board. A "chronic inability" means the continuing or anticipated inability to meet the ANS range over a four to five year period, which is approximately equivalent to the generation time of most salmon species.

Objective

The objective of this action is to create a Tier II system consistent with the sustainable fisheries policy and AS 16.05.258(b)(4), when the harvestable portion of the stock has a chronic inability to provide a reasonable opportunity for subsistence uses.

Specific action recommended to implement the objective

The language of the action option may be included as a provision of a management plan. When the threshold conditions are met, the department will bring to the board options for a Tier II system. Proposals from the public requesting Tier II management may require provisions be developed and implemented before threshold conditions are met.

Benefit

The action creates a process for the development of Tier II system when consistently poor subsistence harvests have occurred. The Tier II system may be tailored to the stock of concern, with input by the public during a noticed board meeting. Clear, measurable conditions for consideration and initiation of Tier II provisions allows the public time to discuss and develop effective Tier II factors to ensure compliance with statutory criteria.

Detriments

Failure to achieve harvest levels within the ANS range may involve other factors that are unrelated to low run abundance. Examples of factors effecting subsistence harvest may include: river conditions affecting harvest efficiency; changes in employment (ex. firefighting); owner of a large dog lot moves or gets rid of his dogs; changes in the reporting of subsistence harvests. It should be clearly established that the chronic inability to meet the ANS range is primarily due to poor salmon runs.

There may be a time lag between the development and implementation of Tier II regulations, during which opportunity by all subsistence users are restricted, rather than distinguishing among subsistence users based on statutory criteria.

Due to the imprecise nature of summer chum salmon run projections, it is possible that the run strength in a given year will be better than expected. If a Tier II fishery has been implemented, some subsistence harvesters may be denied opportunity before inseason run strength indices alert the department that the Tier II fishery is not necessary.

Administration of a Tier II process would be very expensive and difficult on the Yukon River and would not be possible to implement inseason. There are over 1,400 identified subsistence salmon fishing households in the Yukon River drainage. Enforcement of this process would be very difficult given the immense size of the Yukon River drainage and the large potential number of subsistence fishers. Development of the ranking system would be a very long and hard process given the large number of potential applicants and the many factors involved with subsistence use and the subsistence lifestyle.

Performance measures

Performance measures of a Tier II system would be the number of persons receiving Tier II permits and the amounts of fish being harvested under a Tier II system. The intent of the law is that the harvestable portion is harvested by the fishers with the greatest dependency and fewest alternatives for obtaining human food.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

Action Plan Alternatives – Eastern Norton Sound

ACTION #1

When preseason run projections for Yukon River summer chum salmon indicate that commercial fishing will not be allowed and subsistence fishing restrictions may be required to conserve summer chum salmon for escapement needs, the southern boundary of the Norton Sound Subdistrict 6 (Unalakleet) will be adjusted to lower the potential harvest of Yukon River chum salmon.

Objective

Decrease the potential harvest of Yukon River summer chum salmon stocks in the Norton Sound Subdistrict 6 commercial chum salmon fishery.

A tagging study conducted in the Eastern Norton Sound, Subdistricts 5 (Shaktoolik) and 6 in 1978-79 showed the presence of Yukon River summer chum salmon stocks. After analyzing the tagging study, the department concluded that data from the study are not adequate to determine what proportion of the chum salmon present in Norton Sound Subdistricts 5 and 6 are Yukon River stocks.

Total number of chum salmon tagged, and recovered by location in Norton Sound tagging study, 1978-79.

1978	Total Tagged	Total Recovered	Yukon Recovered	1979	Total Tagged	Total Recovered	Yukon Recovered
Unalakleet North	355	46	10	Unalakleet North	129	22	0
Unalakleet South	303	47	11	Unalakleet South	175	27	6
Total	658	93	21	Shaktoolik	237	53	4
				Total	541	102	10

Tagging locations and dates of chum salmon recaptured in the Yukon River, 1978 - 1979.

Tagging Date	Chum Salmon				
	1978		1979		
	Unalakleet North	Unalakleet South	Unalakleet North	Unalakleet South	Shaktoolik
18-Jun				1	
19-Jun					
20-Jun					
21-Jun				2	
22-Jun		1			
23-Jun				2	
24-Jun	1				
25-Jun		1			
26-Jun					
27-Jun	1			1	
28-Jun					1
29-Jun	4				1
30-Jun	3				
1-Jul		1			
2-Jul					
3-Jul		4			
4-Jul					
5-Jul					
6-Jul		3			
7-Jul	1				
8-Jul		1			1
9-Jul					
10-Jul					
11-Jul					
12-Jul					
13-Jul					1
14-Jul					
Total	10	11	0	6	4

Specific action recommended to implement the objective

Move the southern boundary of Norton Sound Subdistrict 6, north to Spruce Creek.

All commercial salmon fishing in the Norton Sound Subdistricts 5 and 6 is by set gillnets deployed in marine waters. Fishing effort is usually concentrated near coastal river mouths. The subdistrict boundaries have been established to focus the commercial harvest on local stocks. Both the Shaktoolik and Unalakleet Subdistricts share a common boundary. Management actions typically encompass both subdistricts because salmon tend to intermingle and the harvest in one subdistrict affects the movement of fish in the adjacent subdistrict.

Commercial periods are scheduled after a 5 to 7 day buildup of inriver run abundance (Unalakleet and Shaktoolik Rivers) to insure commercial harvests are targeting actively migrating local stocks and not on milling fish. Commercial fishing typically begins in June and targets chinook salmon. Emphasis switches to chum salmon around June 25 and the coho salmon fishery begins the third week of July. Pink salmon may be very abundant on even year returns and a pink salmon directed fishery may replace or may be scheduled to alternate periods with the chum salmon directed fishery. During years of poor chum salmon returns to the area, commercial fishing is directed at the harvest of chinook or

pink salmon and the incidental chum salmon harvest is minimized. The commercial harvest averaged 9,801 chum salmon during the recent five-year time period and only averaged 4,772 during 1998-2000. There have been no directed commercial chum salmon fishing periods since 1994, except 1997. The commercial harvests have shown a decreasing trend in recent years coincidentally with the occurrence of poor Yukon River summer chum salmon runs.

Norton Sound Subdistricts 5 & 6 commercial harvest through July 14, 1989 - 2000.

Year	Chinook	Chum	Pink
1989	5,563	30,146 ^a	0
1990	8,505	33,613 ^a	0
1991	5,763	41,047 ^a	0
1992	3,901	57,485 ^a	0
1993	8,528	32,875 ^a	77,246
1994	5,227	2,288 ^b	747,171
1995	8,809	22,381 ^b	73,361
1996	4,980	5,384 ^b	396,346
1997	11,451	10,352 ^a	0
1998	7,213	7,182 ^b	301,836
1999	2,434	3,707 ^b	0
2000	731	3,426 ^b	98,915
1995-1999 avg.	6,977	9,801	-
1989-1999 avg.	6,579	22,405	386,067 ^c

^a 6" mesh allowed in some commercial fishing periods.

^b Mesh restricted to >7.5" or <4.5".

^c Average for pink salmon include even years, 1994 - 2000.

Under current management practices, the chum salmon commercial harvests have decreased in recent years coincidentally with the occurrence of poor Yukon River summer chum salmon runs without changing the fishing area boundary.

Benefits

The number of Yukon River chum salmon being harvested in the Norton Sound Subdistricts 5 and 6 fishery may be reduced, but the amount is unknown. Fishing effort would be redistributed closer to the mouth of the Unalakleet River and further away from the Yukon River. In the 1978-79 studies, all salmon were tagged within 3 miles of the Unalakleet River mouth between June 14 and July 16.

Detriments

Unalakleet Subdistrict commercial fishermen would have a reduced fishing area, causing increased crowding and competition for preferred fishing sites. Harvest of all salmon species may be reduced depending on fish distribution and the amount of crowding that occurs. It may increase salmon harvests for particular local streams within the crowded districts. Depending on run timing and fish distribution of Yukon River summer chum salmon, this option may not reduce the harvest of those fish in some years.

Subsistence issues/considerations

Reducing the boundaries in Norton Sound Subdistricts 5 and 6 would have no effect on subsistence fishing in these subdistricts. The effect on escapement and subsistence harvest in the Yukon River is unknown, but presumably positive.

Performance measures

Currently, the department is unable to quantify any possible reduction in the number of Yukon River summer chum salmon taken in Norton Sound Subdistricts 5 and 6 due to a boundary change.

Research plan to address stock of concern

To determine the proportion of chum salmon present in Unalakleet Subdistrict by river of origin would require either a tagging study specifically designed for that purpose or, if feasible, a stock identification study using genetic, scale pattern analysis or other methods.

ACTION #2

When preseason run projections for Yukon River summer chum salmon indicate that commercial fishing will not be allowed and subsistence fishing restrictions may be required to conserve summer chum salmon for escapement needs, the length and or number of commercial openings directed at chum salmon in Norton Sound Subdistricts 5 and 6 will be reduced to minimize the potential harvest of Yukon River summer chum salmon.

Objectives

The objective of this action is to decrease the potential harvest of Yukon River chum salmon stocks by the Norton Sound Subdistricts 5 and 6 chum salmon commercial fisheries in years when very poor Yukon River summer chum salmon runs are anticipated.

Specific action recommended to implement the objective

Reduce directed chum salmon commercial fishing time in Norton Sound Subdistricts 5 and 6 by reducing the number of fishing periods per week during late June and early July or by reducing the length of fishing periods during late June and early July.

Benefits

The number of Yukon River chum salmon being harvested in the Norton Sound Subdistricts 5 and 6 fisheries may be reduced, but the amount is unknown. A normal fishing schedule in these subdistricts is two 48-hour periods per week during the chinook salmon fishery, which occurs primarily in June, and two 48-hour periods per week during the chum salmon fishery, which typically begins after June 25. Pink salmon may be very abundant on even year returns and a pink salmon directed fishery may replace or may be scheduled to alternate periods with the chum salmon directed fishery. Based on run timing of Yukon River summer chum salmon, it is likely that few Yukon River summer chum salmon would remain in Norton Sound Subdistricts 5 and 6 after July 13. There have been no directed commercial chum salmon fishing periods since 1994, except 1997. Under current management practices, the commercial harvests have shown a decreasing

trend in recent years coincidentally with the occurrence of poor Yukon River summer chum salmon runs. Basically this action would be to maintain the current management strategy.

Detriments

Reduced fishing time, particularly during periods not targeting chum salmon, would result in loss of harvest in Norton Sound Subdistricts 5 and 6 of stocks migrating to drainages within the subdistricts, which are not stocks of concern. There may be a loss of economic value to fishermen participating in the Norton Sound commercial fishery.

Subsistence issues/considerations

Reducing commercial fishing time in Norton Sound Subdistricts 5 and 6 would provide more subsistence fishing time in these subdistricts. The effect on escapement and subsistence harvest in the Yukon River is unknown.

Performance measures

Currently, the department is unable to quantify any possible reduction in the number of Yukon River summer chum salmon taken in Norton Sound Subdistricts 5 and 6 due to a reduction in fishing time.

Research plan to address stock of concern

To determine the proportion of chum salmon present in Norton Sound Subdistricts 5 and 6 by river of origin would require either a tagging study specifically designed for that purpose or, if feasible, a stock identification study using genetic, scale pattern analysis or other methods. The existing chum salmon genetic stock identification baseline does not allow for adequate resolution between rivers of origin.

Attachment 1. Research projects associated with Yukon River summer chum salmon.

Past Projects	Description
Tanana River Sonar	Determine the feasibility to estimate chinook, summer and fall chum salmon passage returning to the Tanana River.
Norton Sound Tagging Study	2-year tagging program (1978-79) to identify the amount of stock interception within the Norton Sound Districts and between the adjacent districts of Kotzebue, Port Clarence, and the Yukon River.
South Fork Koyukuk River Weir	Estimate daily escapement of chinook and summer chum salmon into South Fork Koyukuk River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. Project was moved to Henshaw Creek in 2000 due to susceptibility to flooding.
Anvik River Tower	Estimate daily escapement of chinook and summer chum salmon into the Anvik River. Estimate age, sex, and size composition of the summer chum salmon in the escapement. Project was changed to a sonar project in 1979 and moved to a location lower in the river.

Current Projects (United States)	Description
Commercial Catch and Effort Assessment	Document and estimate catch and associated effort of the Alaska Yukon River commercial salmon fishery via fish tickets of commercial sales of salmon or salmon roe.
Commercial Catch Sampling and Monitoring	Determine age, sex, and size of salmon harvested in Alaskan Yukon River commercial fisheries and to monitor Alaskan commercial fishery openings and closures.
Subsistence and Personal Use Catch and Effort Assessment	Document and estimate the catch and associated effort of the Alaskan Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits, and of the personal use fishery personal use fishery permits.
Sport Catch, Harvest and Effort Assessment	Document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.
Yukon River Salmon Escapement Surveys and Sampling	Estimate population size, or index the relative abundance, of chinook, chum, and coho salmon spawning escapements by aerial, foot, and boat surveys. Estimate the age, sex and size of selected tributary chinook, chum, and coho salmon spawning populations.
Hooper Bay Subsistence Fishing Monitoring	Evaluate the feasibility of determining summer chum and chinook salmon run timing and abundance using subsistence catch data.
Lower Yukon River Set Gillnet Test Fishing	Index chinook, summer and fall chum, and coho salmon run timing and abundance using set gillnets. Sample captured salmon for age, sex and size composition information.
East Fork Andreafsky Weir	Estimate daily escapement, with age, sex and size composition of chinook, summer chum, and coho salmon into the East Fork Andreafsky River. Determine the feasibility of using video and time-lapse photography to improve escapement monitoring.
Yukon River Sonar	Estimate chinook, summer and fall chum salmon passage past Pilot Station in the mainstem Yukon River.
Kaltag Creek Tower	Estimate daily escapement of chinook and summer chum salmon into the Kaltag River. Estimate age, sex, and size composition of the summer chum salmon in the escapement.
Nulato River Tower	Estimate daily escapement of chinook and summer chum salmon into the Nulato River. Estimate age, sex, and size composition of the summer chum salmon in the escapement.
Gisasa River Weir	Estimate daily escapement of chinook and summer chum salmon into the Gisasa River. Estimate age, sex, and size composition of the summer chum salmon in the escapement.
Clear Creek Tower	Estimate daily escapement of chinook and summer chum salmon into Clear Creek. Estimate age, sex, and size composition of the summer chum salmon in the escapement.
Henshaw Creek Weir	Estimate daily escapement of chinook and summer chum salmon into Henshaw Creek. Estimate age, sex, and size composition of the summer chum salmon in the escapement.
Tanana River Fishwheel Test Fishing	Index the run timing of chinook, summer chum, fall chum and coho salmon runs using test fishwheels.
Beaver Creek Weir	Estimate the daily escapement of chinook and chum salmon into the upper portion of Beaver Creek.
Chena River Tower	Estimate the daily escapement of chinook and summer chum salmon returning to the Chena River.
Salcha River Tower	Estimate the daily escapement of chinook and summer chum salmon returning to the Salcha River.
Database Development Project	Inventory and integrate complete complement of historical salmon abundance and ASL data to support the process of determining data shortfalls and needs, and to enhance access to historic data for inseason management purposes.

Proposed Future Projects	Description
Chinook and Summer Chum Salmon Distribution in the Innoko River Drainage	For three years, investigate the distribution of chinook and summer chum salmon in the Innoko River drainage using radio telemetry techniques. Fish will be monitored by remote receiver stations and aircraft.
Locate Salmon Weir Sites in the Innoko River Drainage for Future Installation	During summer 2001, survey streams in the Innoko River drainage for a future resistance board weir site to monitor chinook and summer chum salmon.
Nulato River Weir	Replace the current tower project on the Nulato River with a weir to estimate the daily escapement, and to collect age, sex and size composition of the chinook and summer chum salmon return.
Locate Salmon Weir Sites in the Nowitna River Drainage for Future Installation	During summer 2001, survey streams in the Nowitna River drainage for a future resistance board weir site to monitor chinook and summer chum salmon.
West Fork Andreafsky Weir	Estimate daily escapement, with age, sex and size composition of chinook, summer chum, and coho salmon into the West Fork Andreafsky River.
Lower Yukon River Cooperative Salmon Drift Test Fishing Project	Determine feasibility of using drift gillnets to index timing and relative abundance of chinook and summer chum salmon run in the Lower Yukon River.
Atcheulinguk River Subsistence Fisheries Study	
Yukon River Salmon Traditional Ecological Knowledge	
Abundance and Run Timing of Adult Salmon in the Kateel River	Install a resistance board weir on the Kateel River to monitor daily passage of chinook and summer chum salmon.